BRAIN.

APRIL, 1879.

Original Articles.

THE RE-EDUCATION OF THE ADULT BRAIN.

BY WILLIAM SHARPEY, M.D., LL.D., F.R.S.,

Emeritus Professor of Anatomy and Physiology, University College, London.

Mrs. H., the subject of the following case, is about 24 years of age,* of a pale complexion and slender make. She was married in July 1823, and, with the exception of occasional headaches to which she, in common with some of the rest of her family, was subject, and slight bowel complaints, she previously to that time enjoyed good health, both of body and mind. After her marriage, she resided in England till the end of April 1824, when, in consequence of ill-health, she was brought here by her husband, on a visit to her friends who live in this neighbourhood,† and with whom she had passed a great part of her previous life. From her husband's account, it appeared that for about three months after their marriage she enjoyed perfect health and spirits, but that after that time she complained a good deal of pain in her stomach and bowels; her appetite was bad, she began to lose spirits, imagining herself unequal to the concerns of the house, though her family consisted only of herself and her husband; and now also it was observed that she slept more than usual. The medical gentlemen consulted, believing some of her complaints might be

* This was written in 1824. † Arbroath, Forfarshire.

owing to an affection of the liver, administered mercury in small quantities, and applied leeches to the temples in considerable numbers, with a view to relieve an uneasy feeling of lightness which she complained of in her head; but these remedies proved of little or no avail, and for some time before leaving England, excepting a laxative which she took twice a-week, she had given up the use of medicine altogether. No probable cause could be assigned for these complaints.

On her arrival in this place, which, as already mentioned, was about the end of April last, she had lost but little flesh, and by no means looked sickly; indeed she was little, if at all, changed in her appearance; all her external senses were sound, but her memory was impaired, and she was very inattentive to surrounding objects, which made her dull and absent in company. The sleepiness had been very gradually increasing, and was now arrived at such a height that, unless when conversing with another person, or engaged in some manual occupation, she fell asleep at all times, and in whatever situation or position she might be. When in this state her eyes were nearly close, she breathed softly, and, in short, very much resembled a person in natural sleep, except that when she happened to fall asleep in a position in which the body naturally requires to be supported, as for instance on a chair, she did not lean forwards or backwards as is commonly the case, but sat with her body quite erect, and her head gently inclined to one side. While in this state she was subject to frequent startings, during which she raised herself up, talked as if she were frightened, drew herself back as if to avoid something disagreeable, and then after a few seconds lay quietly down again without having awoke. What she said on these occasions, though quite incoherent, was yet always nearly of the same nature, and for the most part consisted even of the same expressions, which were those of great aversion or horror; of this she had no recollection when awake, nor of anything connected with it; and she herself remarked as something extraordinary that now she did not dream, although she used formerly to be very subject to dreaming. From this sleep she never awoke of her own accord, except to obey the calls of nature; and there was no other way of rousing her

up upon other occasions, but by placing her on her feet and endeavouring to make her walk. When thus forcibly awakened, she was fretful, and cried for some time after. She took food in sufficient quantity, and often with evident relish; but it required much entreaty to make her take the first two or three mouthfuls. The pulse varied a little, but on the whole was nearly natural; during sleep it was commonly from 56 to 70, and somewhat more when awake. Her bowels were very costive, and constantly required the use of laxative medicine; the discharge of urine was natural; the catamenia had hitherto been regular in their appearance, but in small quantity. She complained of no pain or other uneasiness, except a peculiar feeling in the top of the head across the bregma, which she called "funny."

For five weeks after her arrival the torpid state and indifference to surrounding objects continued gradually to become worse, and the difficulty of awakening her daily increased; till at length, about the 8th or 10th of June, it was found impossible to rouse her up at all by any means that could be thought of; and from that time forth, excepting a few short intervals, she remained in a state of constant sleep till the beginning of August. Her condition was now singular enough. She still made an attempt to get out of bed when she required to go to stool; when food was presented to her lips with a spoon, she readily took it into her mouth and swallowed it, and in this way she was fed as long as the torpor continued; when she had taken what appeared a sufficiency, she closed her teeth as a sign she was satisfied, and if importuned to take more, turned away her mouth from the spoon. She appeared also to distinguish different tastes, for she gave an evident preference to some sorts of food and obstinately refused others. She sometimes even, to all appearance, judged of the nature of the food or medicines offered to her, by the sense of smelling; and when the latter were such as possessed a strong odour, she would often close her mouth in a determined manner before they touched her lips.

By this time the startings in her sleep had left her; and although the expressions she uttered when in that state were, with some slight additions, nearly the same as formerly, yet

her manner of speaking was now indicative of satisfaction and not of fright. She often even sang to a simple but cheerful air nearly the same words which she used formerly to cry out with every appearance of the greatest terror.

The torpor continued nearly in the same degree till the end of July, with occasional intervals of waking, which happened at uncertain periods, but generally at the distance of a few days from each other, and were occasioned by pain experienced in some part of her body. The first of these took place after she had been ten days in a continued state of torpor; it was caused by severe griping from laxative medicine. She awakened in great suffering, crying out, "pain," "pain;" "die," "die;" and placing her hands on the abdomen. She was relieved by means of warm fomentations; but she, notwithstanding, kept awake for some hours after, during which time she answered no question, in however loud a voice it was put to her, and recognised nobody except one old acquaintance, whom she had not seen for more than twelve months. She looked stedfastly in this person's face for a few seconds, apparently occupied in trying to remember his name, which at length she found out and repeated again and again, at the same time taking him by the hand as if overjoyed to see him; but when questioned regarding him, she answered only by calling out his name, which she continued to repeat for some time after she had fallen asleep, in addition to what she usually said. In the course of the next eight days she was twice roused from her sleep by a similar cause, but not so completely; the same individual was still the only person she knew; amongst others she did not recognise even her own husband, who happened then to be in Scotland.

The next interval of waking took place three or four days afterwards; it appeared to be occasioned by pain in the head. She cried for some time, then awoke, complaining of pain, with her hand on the forepart of her head, on which also she placed the hand of a person near her and pressed it down firmly with her own; after thus complaining for two or three hours, she fell asleep. The same thing happened on the next and the two or three succeeding evenings, nearly at the same hour, but each time with less complaint. Other circumstances

about this time showed that she was suffering considerable uneasiness in her head. She was very impatient in the erect posture, and, when lifted out of bed, would not put her feet to the ground, but drew up her legs to her body, as if to force those who held her to lay her down again. This, however, was not the case when she required to be taken up for the purpose of making any evacuation. She generally also preferred to lie on her face, and always with her head very low, with both hands firmly clasped over it, exactly on the part to which she had formerly referred the peculiar feeling already mentioned, and showed much uneasiness when they were removed, unless the pressure was continued by the hand of another person.

After this, the torpor continued for some time without being interrupted; but in the meantime the symptoms of pain in the head, and the uneasiness in the erect posture, gradually wore off, and Mrs. H. now no longer talked in her sleep. Her bowels were kept open by laxative medicine, which now did not operate so severely as to wake her. She had, since the beginning of June, had a blister applied to the nape of the neck, and three to the head at different periods; sinapisms to the feet were also had recourse to, and two or three times electric shocks were passed through her arms. These remedies, like other painful stimulants, caused her to complain much; and one of the blisters, which was sufficiently large to cover the whole scalp, made her open her eyes; but their effects were merely temporary, leaving, to all appearance, no permanent impression on her complaint. Lest there might be any serous effusion within the cranium, digitalis was used along with the sweet spirit of nitre, in such quantity as greatly to augment the flow of urine. By its operation her pulse was reduced so low as 44 in a minute; and, while using it, she appeared to suffer from sickness at the stomach, during which she often put her fingers into her mouth, as if wishing for something to eat or drink; and she was subject to what seemed an oppressive feeling in the region of the heart, with a peculiar interruption to her breathing, which came in paroxysms; all which symptoms left her after discontinuing the medicine.

Towards the latter end of July, the torpid state, which had suffered no more intermissions, was become on the whole not

quite so deep; at least Mrs. H. now gave signs of being more conscious of anything that was done to her. She smiled and seemed pleased on receiving particular sorts of food, and when her eye was opened, or any part of her face touched with a finger, her whole countenance became suffused with a blush of redness. Some short time after, it became possible to awake her by opening her eyes, and holding anything before them likely to catch her attention, such as a glass of water, a cup, or the like. When awaked in this way, which succeeded best at the times she was getting her food, she generally laughed a good deal and seemed much delighted, and she always bestowed her whole attention on the vessel in which her food or drink was contained, and the person who held it; she, however, did not speak, and paid no attention whatever to the questions put to her. One day about this time, viz. on the 1st of August, in consequence of her usual medicines failing in their effect, she had two or three laxative clysters, and then a small dose of croton oil, which produced very copious evacuations, but at the same time caused so much griping as to wake her. When suffering from this, she took hold of the blankets of her bed, twisted them in her hands, and applied them over the abdomen, looking wistfully all the while in the faces of the attendants, as if she had recollected the fomentations which had formerly given her relief, and wished them to be had recourse to on the present occasion; her wish was complied with, with the effect of removing the pain, which seemed to give her great satisfaction. In two or three days after this the torpor was much diminished, and she could be awakened with great ease. She likewise began to take a great liking to the young woman who waited on her, so much so that, when awake, she would hardly allow her to be a moment out of her sight. Now also she would sometimes let herself cautiously down on the floor from her bed, and creep to the fireside, where she would lay herself quietly down on the hearthrug, as if she wished to enjoy the warmth of the fire.

At length, after progressively improving for some days, she was by the third week in August almost free from torpor, and slept little more than a person in health. During all this period, except that her feet were sometimes cold, the temperature of

her body was very nearly natural. Her face was for the most part pale, but sometimes a little flushed, and the pupil of the eye uniformly contracted on exposure to the light. Her pulse, which had been rendered slow by the digitalis, was observed to be rather higher for some time preceding her recovery than it had been even before the use of that medicine. She had undoubtedly lost flesh during her illness, but at this time she was not so thin as she had been a short time before. The catamenia had not appeared since the month of May; but, with the exception of considerable loss of strength, her bodily health was now on the whole tolerably good.

On her recovery from the torpor she appeared to have forgotten nearly all her previous knowledge; everything seemed new to her, and she did not recognise a single individual, not even her nearest relatives. In her behaviour she was restless and inattentive, but very lively and cheerful; she was delighted with everything she saw or heard, and altogether resembled a child more than a grown person.

In a short time she became rather more sedate, and her attention could be longer fixed on one object. Her memory too, so entirely lost as far as regarded previous knowledge, was soon found to be most acute and retentive with respect to everything she saw or heard subsequently to her disorder; and she has by this time recovered many of her former acquirements, some with greater, others with less facility. With regard to these, it is remarkable that though the process followed in regaining many of them apparently consisted in recalling them to mind with the assistance of her neighbours, rather than in studying them anew, yet even now she does not appear to be in the smallest degree conscious of having possessed them before.

At first it was scarcely possible to engage her in conversation; in place of answering a question she repeated it aloud in the same words in which it was put, and even long after she came to answer questions she constantly repeated them once over before giving her reply. At first she had very few words, but she soon acquired a great many, and often strangely misapplied them. She did this, however, for the most part in particular ways; she often, for instance, made one word answer

for all others, which were in any way allied to it; thus in place of "tea," she would ask for "juice," and this word she long used for liquids. For a long time also in expressing the qualities of objects, she invariably, where it was possible, used the words denoting the very opposite of what she intended. and thus she would say "white" in place of "black," "hot" for "cold," &c. She would often also talk of her arm when she meant her leg, her eye when she meant her tooth, &c. She now generally uses her words with propriety, although she is sometimes apt to change their terminations, or compose new ones of her own.

She has as yet recognised no person, not even her nearest connections; that is to say, she has no recollection of having seen or known them previously to her illness, though she is aware of having seen them since, and calls them either by their right names or by those of her own giving; but she knows them only as new acquaintances, and has no idea in what relation they stand to herself. She has not seen above a dozen people since her illness, and she looks on these as all that she has ever known.

Amongst other acquirements she has recovered that of reading; but it was requisite to begin her with the alphabet, as she at first did not know a single letter. She afterwards learnt to form syllables and small words, and now she reads tolerably well, and has shown herself much interested in several stories previously unknown to her, which she has read since her recovery. The re-acquisition of her reading was eventually facilitated by singing the words of familiar songs, from the printed page, while she played on the piano. In learning to write she began with the most elementary lessons, but made much more rapid progress than a person who had never before been taught. Very soon after the torpor left her, she could sing many of her old songs, and play on the pianoforte with little or no assistance; and she has since continued to practise her music, which now affords her great pleasure and amusement. In singing, she at first generally required to be helped to the first two or three words of a line, and made out the rest apparently from memory. She can play from the music-book several tunes which she had never seen before; and her friends

are inclined to think that she now plays and sings fully as well, if not better, than she did previously to her illness. She learnt backgammon, which she formerly knew, and several games at cards with very little trouble; and she can now knit worsted, and do several other sorts of work; but with regard to all these acquirements, as already mentioned, it is remarkable that she appears not to have the slightest remembrance of having possessed them before, although it is plain that the process of recovery has been greatly aided by previous knowledge which, however, she seems unconscious of having ever acquired. When asked how she had learnt to play the notes of music from a book, she replied that she could not tell, and only wondered why her questioner could not do the same.

She has once or twice had dreams, which she afterwards related to her friends, and she seemed quite aware of the difference betwixt a dream and a reality; indeed, from several casual remarks which she makes of her own accord, it would appear that she possesses many general ideas of a more or less complex nature, which she has had no opportunity of acquiring since her recovery.

In this way she has continued slowly but progressively to improve, and it is now considerably more than two months since she recovered from her sleep. Her bodily health has since then undergone little change; she is still liable to be fatigued by slight exertion, after which she is inclined to sleep; but in this state she never remains long except during the night, when she sleeps like another person. The catamenia have twice appeared, viz. in September and in October, at both times to a greater extent than usual; her bowels still require laxative medicine; but her appetite continues good, and she has evidently gained flesh since her recovery.

Postscript (March 1879).—After a time Mrs. H. was able to return to her home, in England, where she passed the rest of her life happily with her husband, and gave birth to a daughter, who survives her. She was in the habit of corresponding by letter with her friends at a distance, and lived on the most agreeable terms with her immediate neighbours, by whom she was held in much regard on account of her kindly nature and charitable work.

OBSERVATIONS ON NEURITIS AND PERI-NEURITIS OF SOME OF THE CRANIAL NERVES.

BY JULIUS ALTHAUS, M.D., M.R.C.P. LOND.,

Senior Physician to the Hospital for Epilepsy and Paralysis, Regent's Park.

(*Concluded from Vol. I., p. 528.*)

2. *Auditory Neuritis.*—The series of symptoms generally known as Menière's disease appears to me to be owing to a considerable variety of anatomical lesions, and the term which has been given it, in order to mark the merit of the illustrious French aurist who first drew attention to this class of cases, is therefore somewhat of a misnomer, as it does not designate a pathological entity. It is true that we possess at present only a few and meagre post-mortem records of such cases; yet the clinical symptoms are sufficiently striking to enable us to decide that they cannot all be owing to one and the same morbid process, and that the only connecting link between them is that their seat is in the membranous labyrinth. I think it would be best to confine the term, "Menière's disease," to apoplexy of, or more properly speaking hæmorrhage into, the labyrinth, as most of the cases described by Menière belong to that class, and the only case in which he obtained an autopsy was also one of them. This was the case of a young woman who took cold at the period of menstruation, while riding on the top of an omnibus, and was suddenly seized with deafness, persistent vertigo, and vomiting. She died on the fifth day, and it was found that the centres of the nervous system were perfectly healthy, but that the semicircular canals on both sides were filled with a clot of blood, replacing the endolymph. This clot extended in a minor degree into the vestibule, but

did not spread as far as the cochlea. Similar cases, but in which the cause was injury to the bone, causing hæmorrhage and subsequent inflammation, have been recorded by Politzer and Voltolini. In one of them the injury was a blow on the temple, in the other a fall on the back of the head. In other cases the symptoms have come on without any apparent cause, and it is not improbable that in these the hæmorrhage may have been owing to rupture of miliary aneurisms of the labyrinthine arterioles, and therefore be analogous to the ordinary form of cerebral hæmorrhage. Such hæmorrhage, however produced, causes an increase of the intra-auricular pressure, which is quite sufficient to account for such symptoms as deafness, tinnitus, unsteady posture, so that the patients are unable to stand or walk firmly, and fall down, or are only prevented from falling by the bystanders; together with fainting, nausea, vomiting, and in some cases insensibility.

There are, however, unquestionably other pathological processes giving rise to symptoms similar to those just described. One of them I believe to be simple hyperæmia of the labyrinthine blood-vessels, which I suspect in cases where the symptoms are sudden in their onset, not very severe, and transitory in their appearance. Sometimes the attack is entirely over in a quarter of an hour, without leaving any traces; and in such cases it is impossible to assume the existence of hæmorrhage. Another and more important lesion I believe to be inflammation, which may be idiopathic, *i.e.* occurring without any apparent cause, or symptomatic, *i.e.* coming on in the course of severe systemic affections, more particularly pyæmia, the eruptive fevers, erysipelas, typhoid and puerperal fever, constitutional syphilis, &c. Again, inflammation may spread contiguously to the labyrinth from other parts, such as the middle ear, when this is affected by acute catarrh and purulent inflammation; and from the membranes of the brain, in sporadic or epidemic cerebro-spinal meningitis. It is also worthy of notice that somewhat sudden deafness occurs in connection with infantile eclampsia, and it appears highly probable that in such cases the real cause of the convulsive seizures, as well as of the deafness, is irritation or inflammation of the labyrinth, and that the fits are caused by the extreme liability of infants

to convulsive attacks from whatever cause, whether central or eccentric. Inflammation of the labyrinthine expansion of the auditory nerve I believe to be more common than is generally thought, and it has no doubt often been confounded with congestion or inflammation of the brain, and even been put down as an attack of severe dyspepsia and congestion of the liver. The chief difference in the clinical symptoms of hæmorrhage and inflammation is that the symptoms are not so severe and sudden in their onset in the latter, that they continue for a more considerable time, and become gradually more developed.

I will now relate the details of a case of what I believe to have been neuritis of the labyrinthine expansion of the auditory nerve, which occurred in a patient who was admitted into the hospital under my care in January 1876, suffering from progressive locomotor ataxy.

H. W., aged 32, married, father of three children, and a butcher by trade, had been in good health until the commencement of 1875, when he began to feel poorly, and suffered from a troublesome form of indigestion, with nausea and loss of appetite. In May of the same year he suddenly began to squint and see things double, evidently from paralysis of one of the ocular muscles, although it would be impossible to determine at present which one of them was affected. These latter symptoms lasted only for a few days and then left him; but shortly afterwards he was affected with vertigo and a roaring noise in the head. There was also a feeling of sickness, but no vomiting. Within a few days the tinnitus increased considerably, and appeared to him like thunder, or as if there were explosions of gunpowder in his head; at other times it resembled the ringing of bells and screaming of whistles. There was at no time any loss of consciousness. This severe form of tinnitus lasted for rather more than a month, during which time the hearing of the patient, which before then had been perfectly good, was *gradually* much diminished, and at the end of the period mentioned he found himself completely deaf. By this time the vertigo had left him, but, on going about, he noticed that he did not walk as well as before, more particularly in the dark, and was apt to stumble, especially on turning round; and he felt the peculiar sensation as if walking on

cotton or bladders. Pain of a character peculiar to ataxy began to shoot through the lower extremities, more especially in the night, and on exposure to wet or cold. The ataxy increased rapidly, in spite of medical treatment, so that he became completely helpless; and when he entered the hospital, in 1876, he had already reached the third stage of the disease, in which not only the co-ordination of movements but also muscular power suffers.

The examination of the patient proved unusually troublesome, as he was stone-deaf, and all questions had therefore to be written down for him on a slate. He was found to be utterly insensible to the shrillest and loudest noise, such as that of a cab-whistle blown just behind him, as well as to the sounds of musical instruments. He could not hear a watch tick when it was applied to the external ears or the cranial bones around; nor did he perceive the sound of a tuning-fork applied to the vertex and to the teeth. On applying the constant voltaic current to the ears, however, a distinct sound was perceived on making with the cathode and breaking with the anode. This sound the patient likened to a "blowing" or "ringing" noise, and it appeared to continue for some seconds after the current had commenced and ceased to act. This was over and above the habitual tinnitus, which never left the patient, and which was now of a moderate kind, resembling the flowing of water. The patient spoke intelligibly, and although he could not hear himself speak, he had no deficient or altered intonation of the voice.

The physiognomical expression was peculiar. His features appeared in perfect repose, and unimpressionable, except when a question in writing was put to him. Having noticed a similarly statuesque expression in anæsthesia of the fifth nerve, from loss of cutaneous and muscular sensibility, I carefully tested the sensibility all over the face, but found it perfectly normal; and the total absence of physiognomical expression was therefore in this case owing to the patient being as it were shut out from the world, and his being indifferent to what went on around him.

I will here remark at once that some time later I had the advantage of Mr. Dalby's opinion on the state of the patient's

ears. He confirmed my diagnosis of the nervous origin of the deafness, as he found the external and middle ear, including the Eustachian tube and the tympanum, perfectly healthy. The conduction of sound was good, but the perception of it faulty, and he therefore thought the deafness due to change in the nervous structures, either in the labyrinth or intra-cranial.

The patient had not inherited any tendency to nervous affections such as paralysis, insanity, or neuralgia. He had always been a steady, hard-working man, not given to alcoholic or venereal excesses. He had never had syphilis or gonorrhea. He never smoked. He had, however, in his trade, as a butcher, been obliged to go about a great deal in all kinds of weather, and in the small hours of the morning, and had lately had much anxiety about money matters.

There were no symptoms indicating cerebral disease; the intellect, memory, and speech being quite normal, and all the cerebral nerves, with the only exception of the auditory, were in full functional activity.

The spine was not tender to pressure or percussion, nor was there any spontaneous pain in it; and the pain in the limbs was less marked than it had been some time ago. There was incomplete cutaneous anæsthesia from the waist downwards to the feet, and also incomplete muscular anæsthesia. Tickling the soles produced no reflex movements, and pinching the gastrocnemius and rectus femoris produced hardly any sensation. The muscles were flabby and somewhat wasted, but responded freely to the voltaic and faradic currents. The patient could not walk at all, except when supported by two persons, and even then he had the greatest difficulty in stepping out, the peculiar jerking gait of ataxy being perfectly discernible. The helplessness was so great that it verged on paralysis. He could only stand when supported by two sticks, and when he closed his eyes he reeled like a drunken man. Yet he could, when lying down or sitting on a chair, move his legs and feet more freely than a patient can do who is suffering from myelitis or a high degree of spinal congestion.

The sexual power had been gradually lost during the last six months, and the bladder and rectum likewise participated

in the disease. There was great difficulty in passing water, the patient having to strain for fifteen or twenty minutes before he succeeded in voiding a few ounces of urine. Occasionally there was incontinence. The urine was habitually neutral, and contained a large excess of urea and phosphates, but no albumen or sugar. The bowels were confined, and when purgatives were administered they often acted so rapidly that the fæces were voided before the patient had time to reach the commode.

The upper extremities were unaffected, with the exception of a slight feeling of numbness in the third and little finger of the left hand. The heart and lungs were healthy. The appetite, however, was very bad, and digestion much impaired; the tongue was furred. There was tenderness in the right hypochondrium, and increased dulness in the region of the liver. The patient was considerably emaciated, and had a sallow and dyspeptic complexion. He was ordered nitrate of silver, hypophosphite of soda, and podophyllin. For two months no change for the better took place; on the contrary, the helplessness increased, and there was more frequently than before incontinence of the bladder and bowels.

Towards the end of March the patient was suddenly taken with vertigo, followed by coma. There were no convulsions. The complexion became of a deeper sallow, and after a time dark brown; the tongue had a dirty brown coat; there was involuntary discharge of the excretions. The pupils were very small. The right hypochondrium was very tender, the pulse 120, the temperature 99·5°. In three hours the coma was less severe, and he was given five grains of Plummer's pill, followed by five grains of carbonate of ammonia every four hours in mixture. On the next day the coma was not profound; the morning temperature was 100·2°, pulse 110; the evening temperature 101·5°, pulse 120. The next day the insensibility had again lessened; the patient could be roused by talking loud to him; the morning temperature was 99·6°, the evening 101·4°. On the day after that the improvement was more decided; the expression brighter, the complexion less dark, consciousness had returned, the evening temperature was only 99·2°. On the fifth day the patient ate with a good

appetite, and retained the fæces and urine for the first time. The temperature was 99·2°, the pulse 90. On sitting up he felt giddy.

From this time forward he rapidly improved, and a week afterwards he was again in the same condition as before this attack. The medicines he had previously taken were now discontinued, and the liquid extract of ergot prescribed in half-drachm doses three times a day. This had an excellent therapeutic influence, since under its use a steady improvement took place in all the spinal symptoms. The remedy was gradually pushed up to a drachm three times daily, and was only discontinued once for a few weeks, after having been taken for three months, as the patient then complained of general malaise, with loss of appetite, and had a feeble pulse. The citrate of iron and quinine was then substituted for the ergot, with good results as far as those symptoms were concerned; but there was now no further improvement in the spinal disease, and the ergot was therefore resumed a few weeks afterwards in forty-minim doses. It was altogether taken for eight months; and at the end of that time the patient had entirely recovered from all symptoms of ataxy; only the deafness and the tinnitus continued exactly the same. He was discharged in February 1877, being then able to walk easily three or four miles; and when seen twelve months later, had been able to attend to his business just as before the commencement of the affection, and had had no further attacks of vertigo or insensibility, or, in fact, any other ailment.

Remarks.—It is now well understood that the auditory nerve is not simply a nerve of special sense, but has a distinct relation to certain centres which regulate the equilibrium of the head and the body. These functions appear to be so divided that the cochlear branch of the portio mollis is the real nerve of hearing, while the vestibular branch of the same regulates equilibration. Section of the auditory nerve in the skull, before it has divided itself into its two branches, causes both deafness and loss of equilibrium. A frog whose auditory nerves have been cut, may still jump when irritated, but will not regain its proper position afterwards; it falls on its

back or side, and rolls over and over, without being able to steady itself. The same is seen when the semicircular canals in the membranous labyrinth are injured, while injury of the same in the osseous labyrinth produces no such effects. Pigeons in whom Flourens destroyed these canals, heard as well as before, but showed loss of equilibration: while they lost their hearing, and showed no loss of equilibrium, when the cochlea was injured. In opposition to this, Menière taught that disease of the semicircular canals alone would cause deafness as well as vertigo; but it appears now well-established by the researches of Goltz, Vulpian, Crum Brown and others, that these canals have nothing to do with hearing, but serve to maintain the normal attitude of the body. These exceedingly difficult and intricate experiments are somewhat facilitated by adopting Vulpian's plan, which consists of previously feeding the animal with madder, whereby the canals are stained bright red, and are therefore rendered distinct from the bones in which they are enclosed, and which have a much paler colour. Each of the three canals appears, according to the most recent observers, to have a different function. Thus, division of the superior canals causes the head to be rapidly moved forwards and backwards, and there is tendency to execute a somersault forwards, heels over head; similar phenomena being induced by lesion of the anterior portion of the middle lobe of the cerebellum. Lesion of the external or horizontal canals produces rapid oscillations of the head and eyes from one side to another, and tendency to spin round; phenomena corresponding to those after injury to the lateral lobes of the cerebellum. Finally, destruction of the posterior or inferior canals leads to rapid movements of the head backwards and forwards, with tendency to execute a somersault backwards, head over heels; and lesion of the posterior portion of the middle lobe of the cerebellum will cause corresponding signs. That there should be such correspondence is readily accounted for by the microscopical investigations of Lockhart Clarke and Meynert, who have shown that the auditory nerve is, through the restiform bodies, in direct communication with the cerebellum, which we look upon as the central organ of equilibration.

Integrity of the labyrinth is therefore shown to be necessary for the maintenance of equilibrium of the head and the body; and labyrinthine impressions are shown to be more important towards securing that end than any visual or tactile impressions, which are also concerned in it. These impressions appear to be dependent upon variations of pressure in the endolymph which fills the membranous canals. Pressure or tension of this liquid excites the terminations of the nerves in the canals and their dilatations or ampullæ. In accordance with the law of gravity, the endolymph distends mostly those portions which lie deepest; and the pressure naturally varies with the movements and position of the head, so that each position corresponds to a definite state of nervous stimulation. The perception and consciousness of this state by the brain constitutes the sense of equilibrium, and thus serves to regulate the movements of the body. As soon, therefore, as any injury to the canals has taken place, the brain ceases to receive accurate information of the position of the head, and is rendered unable to calculate and direct its movements in a proper manner. This disturbance is temporary when lesion of the canals exists on one side only, but is rendered permanent when both sides are affected. Loss of one eye does not produce blindness; and the organ of one side may, by a certain amount of training, become efficient to inform the brain of the position of the head and the body.

Dr. Ferrier[1] finds the auditory centre to be situated in the superior temporo-sphenoidal convolution of the hemispheres. When this part is faradised in the monkey, there is a sudden pricking up of the opposite ear, wide opening of the eyes, dilatation of the pupils, and turning the head and eyes to the opposite side—signs resembling the sudden start and look of surprise that are caused when a loud sound is made suddenly close to the animal's ears; both being indications of subjective auditory sensation. Faradisation of the corresponding part of the brain in other animals whose habits are such as to make their safety depend upon the acuteness of their hearing, as for instance the rabbit and the wild jackal, causes even more striking effects, viz. in addition to those already mentioned, a quick

[1] Loc. cit. p. 171.

start or bound as if to escape from danger which might be indicated by loud or unusual sounds. Destruction of this convolution on both sides causes complete deafness; unilateral destruction of it renders the animal deaf on the side opposite the lesion.

Taking into account these several facts, we cannot experience any difficulty in arriving at a definite conclusion concerning the precise seat of the pathological lesion in the case which I have just related. It was evidently not located in the superior temporo-sphenoidal convolution, which, although the centre of hearing, has nothing to do with the equilibration of the body; nor could we consider the case one of cerebellar disease, the cerebellum being only the central organ of equilibration, but having nothing to do with the sense of hearing. The lesion must therefore have been seated in the auditory nerve, which presides over both hearing and equilibration, and destructive lesions of which will cause deafness as well as vertigo.

At what part of the anatomical distribution of the portio mollis was the disease located? Evidently not at its root in the medulla, because there it is contiguous with the sentient root of the fifth nerve, and there would therefore no doubt have been anæsthesia of the face together with the deafness. A case of this latter kind has been described by Professor Moos, in the 'American Archives for Ophthalmology and Otology.'[1] Nor was it likely that the nerve-trunk was affected where it emerges from the lower border of the pons Varolii. I believe this portion of the nerve to have been healthy, because there was galvanic response on applying the voltaic current to the ears; and such response appears to be absent in destruction of the nerve-trunk. We are therefore led to the conclusion that the disease affected the labyrinthine expansion of the nerve, comprising its branch for the cochlea as well as for the vestibule.

The last point we have to consider is the nature of the pathological lesion in the labyrinth. This I believe to have been an acute inflammation, as there was a period extending over rather more than a month in which there were evident

[1] Vol. ii. p. 199.

signs of special hyperæsthesia of the labyrinthine expansion of the nerve, which were followed by special and permanent anæsthesia. These symptoms correspond very closely to those which I have observed in acute olfactory and trifacial neuritis. The bad form of indigestion with nausea, loss of appetite and giddiness, with which the illness commenced in the first instance, was probably due to hyperæmia of the auditory nerve. This increased suddenly, perhaps, in consequence of some particularly severe exposure to the inclemencies of the weather, which the patient's occupation necessitated, to inflammation, which lasted the usual term of acute neuritis, viz. from four to five weeks. The *gradual* loss of hearing during the period just mentioned speaks against hæmorrhage in the labyrinth, in which deafness is more suddenly developed. The cord-affection which followed the attack of auditory neuritis was likewise of a more markedly inflammatory character than is usual in ataxy, as the symptoms became developed with far greater rapidity than is seen in the large majority of cases. The intercurrent attack of illness which the patient had at the end of March, while in the hospital, was, in my opinion, owing to an attack of hæmorrhage into the labyrinth. The attack commenced with sudden loss of consciousness, accompanied with some rise in the temperature, and left no further traces. The hearing having already been completely destroyed, no further damage could be done in that quarter.

3. *Peri-neuritis of the Portio Dura.*—One of the commonest affections of the cranial nerves is paralysis of the portio dura, more especially that form of it which is caused by the sudden influence of cold, and the more prominent symptoms of which are so well known that I need not describe them here. There are, however, several points connected with this affection on which still much obscurity prevails, and to which I will briefly refer, in the hope of contributing somewhat to their elucidation. I will, however, confine myself in this place to a consideration of that form of facial palsy which I consider to be owing to rheumatic peri-neuritis of the nerve, without going into other forms of the complaint which are produced by injury, such as wounds, surgical operations about the face,

application of forceps during delivery; or by pressure from neighbouring parts, such as abscess, swollen glands, tumours, periostitis, or paralysis induced by cerebral disease.

Although post-mortem examinations of cases of rheumatic peri-neuritis of the portio dura are as yet entirely wanting, yet there can be no doubt that this palsy is really owing to an inflammatory swelling of the peri-neurium of the nerve, with more or less considerable effusion of lymph. This is shown by the mode of its onset, which is generally sudden, after some unusual exposure to cold, while in some cases it is only established a day or two after the cause has acted. In the commencement there may be pain about the face, headache, twitches in the affected muscles, and tinnitus aurium; but as the portio dura is almost exclusively a motor nerve, there is naturally much less pain than occurs in neuritis of purely sentient or mixed nerves. The principal symptom is therefore the palsy, which is more or less severe and extensive, according to the intensity of the cause which produces it, the condition of the patient at the time he becomes subject to the affection, and more especially according to the anatomical seat of the lesion.

Broadly speaking, we may divide all these cases into two large classes, viz. those where the inflammation occurs outside, and those where it occurs inside, the Fallopian aqueduct. In external peri-neuritis, which affects the nerve immediately after having emerged from the stylomastoid foramen, the pressure of the inflammatory swelling upon the contents of the nerve-tubes is not very great, as the nerve is there surrounded by soft parts, and therefore not so apt to be injured by squeezing; and in consonance with this we find that facial palsy from external neuritis generally gets well in two or three weeks. This would be inconsistent with the assumption of actual neuritis, in which the cylinder axis is destroyed. The most prominent symptoms of this variety of the affection are palsy of all the facial muscles of one side, and loss of reflex excitability in them, on irritating the conjunctiva of the eye and eyelids, or the skin of the face. The electric response of the muscles, both to the faradic and voltaic current is normal, and there is an absence of all symptoms

implicating the senses of taste and hearing, and the soft palate.

That the seat of this external peri-neuritis is not in the peripheral branches of the nerve, or the pes anserinus, but in the trunk of the nerve, shortly after it has left the skull, is plainly shown not only by the paralysis affecting all the muscles of the face, but also by there being no affection of sensibility. If the seat of the inflammation were more peripheral, some facial muscles would no doubt be spared, and sensation in the face would suffer, from the intimate connection which exists between the branches of the facial and of the fifth nerve. A final proof of what I have just advanced is that, in some few patients of this class, paralysis of the small muscles which move the ear has been observed. These muscles are supplied by the posterior auricular nerve, which is the first branch given off by the portio dura after its exit from the stylomastoid foramen, and which also gives a twig to the posterior belly of the occipito-frontalis muscle. Most people are indeed unable to move their ears, but some few can, and in some of them inability to move one ear has been observed under these circumstances.

The second large class of cases of facial palsy is that which is owing to *internal peri-neuritis* affecting the nerve at some point during its transit through the Fallopian canal. In such cases the cause and degree of the inflammation may be exactly the same as in external peri-neuritis; yet the results are more serious, for the nerve is there no longer surrounded by soft parts, but enclosed in rigid walls. The same amount of swelling will therefore give rise to a much more severe compression of the contents of the nerve-tubes, and thus cause more degeneration and wasting in the same. The prognosis of internal peri-neuritis is therefore much less favourable than that of the external variety of the disease; and it is an interesting fact that, by a careful electric exploration of the affected nerve and muscles, we are enabled, within the first week or two, to determine with a great degree of accuracy whether the patient is likely to recover quickly, or only within from three to six months. In internal peri-neuritis, where there is more squeezing, we discover generally within eight or

ten days from the commencement of the affection, and sometimes even sooner, that peculiar alteration in the faradic and voltaic excitability of the nerve and muscles which I have called the *wasting-test*, and the importance of which cannot be overrated.

The distinctive feature of this test is that the induced or faradic current loses all influence upon the paralysed nerve and muscles, so that, on comparing the two sides of the face in this particular, faradisation of the portio dura and all the individual muscles of the face will cause these to move on the healthy side, but remains ineffectual on the paralysed side. Again, the constant voltaic current loses in a similar manner its influence upon the *nerve*, but acquires increased action over the individual muscles which are paralysed. It is therefore seen that a constant current, which is too feeble to produce an effect on the healthy muscles, will cause the paralysed ones to act very readily. This fact was first pointed out by Baierlacher. At the same time the character of the voltaic contraction is altered. It does not occur with that lightning-like rapidity which it assumes in the healthy muscle, but is sluggish, tardy, inert, and recalls to one's mind those muscular contractions which are seen in physiological laboratories in frogs whose nerves have been paralysed by woorare or coniine.

These phenomena are only present where there is muscular wasting owing to nerve-lesions, so that the term wasting-test appears to be an appropriate one to designate them. The *absence of the wasting-test is characteristic for external, and its presence for internal peri-neuritis*, the reason for this being that in external inflammation there is less pressure on the nerve, and consequently no muscular atrophy; while in internal inflammation the nerve is thoroughly squeezed, and thereby loses its nutritive or trophic influence over the muscles supplied by it. In the former case, therefore, the patient generally gets well within two or three weeks, while in the latter recovery will be protracted over from three to six months and even more; or the nerve may not recover at all, but the paralysis may in its later stages become complicated with muscular rigidity, twitches and atrophy, which imparts a most peculiar expression to the countenance. Such consequences are not

simply owing to disuse of the muscles, for they do not occur in facial palsy from cerebral origin even when this has lasted much longer, but are due to the withdrawal of nutritive power, from nerve lesion.

Internal peri-neuritis of the portio dura may be subdivided into several forms, according to the exact spot in the Fallopian aqueduct where it occurs; and in no other disease can we trace the anatomical distribution of the inflammation, simply from the clinical symptoms, in a more minute manner than in the one to which I am now drawing attention. The Fallopian aqueduct may for this purpose be divided into three different sections, the first of which reaches from the stylomastoid foramen to a point just before the origin of the chorda tympani; the second embraces the chorda and the Stapedian nerve; and the third corresponds to the ganglion geniculum, where the petrosal nerves take their rise. The nerve may, however, also be subject to inflammation at the base of the brain.

(*a*) Where the inflammation takes place in the *first section* of the Fallopian canal, below the origin of the chorda, we have the same symptoms as in external peri-neuritis, viz. facial palsy and loss of reflex excitability; but in addition to this the phenomena of the wasting-test in the paralysed muscles. Erb has drawn attention to certain hybrid forms of the disease in which the wasting-test is somewhat blurred and indistinct, there being no actual loss, but only diminution of faradic excitability of the nerve and muscles, which latter show increased voltaic response. This indicates that the pressure on the nerve is not very great, and that tolerably rapid recovery may be expected. Such cases probably correspond anatomically either to a severe form of external, or to a mild form of internal peri-neuritis in the first section of the Fallopian canal.

(*b*) If the *second intra-Fallopian section* of the nerve be inflamed, we find, besides the foregoing symptoms, a peculiar modification of the sense of taste, which has to be ascribed to the chorda tympani being involved in the inflammation. The patient then experiences an acid, or metallic, or bitter, or simply a disagreeable taste, in the corresponding half of the tongue; and on testing the anterior portion of that organ

with saline, bitter, sweet, and acid substances, it is found that they are not perceived there. The back part of the tongue which is supplied by the glosso-pharyngeal nerve, and the opposite side of the organ, the nerves of which are unaffected, continue as keenly sensitive to sapid substances as previously, so that the patient before the examination is often not aware that the sense of taste is impaired. The chorda tympani proceeds from the portio dura to the lingual branch of the fifth nerve, and ends in the submaxillary ganglion. It is no doubt owing to this latter circumstance that, coincidently with the loss of taste, there may be great dryness in the corresponding side of the mouth, owing to arrested secretion of saliva in the submaxillary gland. The experiments of Nawrocky have rendered it probable that the chorda also influences the secretion of saliva in the sublingual gland, and that the parotid receives secretory fibres from the superficial minor petrosal nerve, so that the dryness of the mouth is amply accounted for. Eulenburg[1] has suggested that the dryness of the mouth may be owing to its being always a little open, in consequence of the paralysis of the orbicularis oris, whereby the evaporation of saliva is accelerated; but this theory seems to me unsatisfactory, as dryness of the mouth does not occur in facial palsy from cerebral or medullary origin, where, nevertheless, the mouth is somewhat open; and I hold therefore to the view that the symptom is owing to paralysis of the chorda tympani.

Another interesting symptom of neuritis in the second intra-Fallopian section of the portio dura is *hyper-acusis*, or oxyokoia, that is, hyperæsthesia of the sense of hearing, which has to be attributed to paralysis of the Stapedian nerve. This nervelet, which leaves the portio dura a little above the chorda tympani, supplies the Stapedius, or levator tympani muscle. The pressure in the tympanum and the tension of the drum of the ear are regulated by two different muscles which receive their nervous supply from different sources, viz. the levator, which is animated by the Stapedian from the portio dura, and the tensor tympani, which receives a branchlet from the otic ganglion of the fifth nerve. This latter muscle does therefore

[1] 'Lehrbuch der Nervenkrankheiten.' 2nd Edition. Berlin, 1878. Vol. ii. p. 115.

not participate in the paralysis, but attains increased action by removal of the influence of its antagonist. The drum of the ear therefore acquires a higher degree of tension, the pressure in the tympanum is intensified, and excessive keenness in the appreciation of all musical sounds is the result. These sounds also appear somewhat lower than they really are, besides which there is a considerable degree of tinnitus, and an uncomfortable sensation of pressure in the internal ear. Whenever therefore we meet with hyperacusis in affection of the portio dura, we are justified in assuming that the seat of the disease is above the origin of the Stapedian nerve. This peculiar affection of hearing is entirely independent of any disease of the auditory nerve itself, and of internal purulent otitis, which are such frequent complications of facial palsy.

(*c*) Where the peri-neuritis affects the *third* intra-Fallopian section of the portio dura, at its bend, and implicates the ganglion geniculum, near the internal end of the aqueduct, another important symptom makes its appearance. At this point the portio dura sends off the large superficial petrosal or Vidian nerve, which proceeds to the spheno-palatine ganglion, and through it to the soft palate, where it supplies the levator palati muscle. Vidian paralysis therefore causes deficient action of the velum palati, which droops on the paralysed side, and does not respond well to reflex or electrical excitation. In some cases it has been found deviated to the other side; and there may be difficulty of deglutition, a nasal twang in the voice, and regurgitation of liquids through the corresponding nostril. The uvula may also be found deflected either to the healthy or to the paralysed side. We can easily understand why it should be pulled to the healthy side, from preponderance of the healthy muscle; but why should it be found deflected to the paralysed side? Dr. Sanders has suggested that this is owing to increased action of the pharyngo-palatinus muscle, whose fibres terminate at the base of the uvula, and which is the antagonist of the levator palati. This muscle would therefore act more powerfully on the paralysed than on the healthy side, receiving its nervous supply from a different source. The matter is, however, rendered very complicated by the circumstance that the uvula is not by any means straight in many

healthy persons; and conclusions from an oblique position of it must therefore be drawn with considerable caution.

Nearly at the same level with the large superficial petrosal, the portio dura sends off the small superficial petrosal to the otic ganglion, and the external superficial petrosal to the sympathetic plexus of the middle meningeal artery; but symptoms owing to paralysis of these nerves have not yet been observed. Peri-neuritis in this third section of the Fallopian aqueduct is rare, and we therefore find that the symptoms just mentioned are absent in the majority of cases.

A common complication of facial palsy is deafness, which is owing to simultaneous affection of the portio mollis. Both nerves may be affected at the base of the brain, or there may be purulent internal otitis, in which case there is generally perforation of the membrana tympani, and purulent discharge from the external ear. If the portio dura becomes inflamed at the base of the brain, where it emerges from the posterior border of the side of the pons Varolii and the lateral tract of the medulla oblongata, there are almost invariably symptoms on the part of other cerebral nerves, more especially the portio mollis. This is seen in syphilitic periostitis, exostoses, and gummatous tumours, and is generally more owing to squeezing from without than to neuritis or peri-neuritis. Facial palsy is also observed in affections of the nucleus of the nerve in the medulla, pons, the cerebral peduncles and hemispheres, but is then generally owing not to inflammation, but to softening, hæmorrhage, tumours, &c., and does not therefore fall into the sphere of the present paper.

The prognosis of peri-neuritis is generally much more favourable than that of neuritis, because in the former, although there is pressure on the nerve-tubes, yet the cylinder axis generally escapes destruction, while in the latter the whole of the contents of the nerve, including its central core, is destroyed. Thus we find that almost all cases of facial palsy ultimately recover, while olfactory and auditory neuritis is rarely influenced by any treatment. It is true that these latter cases are generally only specially treated after the inflammation has subsided, and when the nerve-tubes are left in a state of hopeless decay.

If a case of acute neuritis is recognised in the beginning, it should be treated according to general principles, i.e. by leeches, blisters, and the application of ice as near as possible to the seat of the disease. This should be combined with the internal administration of calomel and opium, in doses of one grain each, several times a day. After the acute stage has subsided, a stimulating treatment must be resorted to, more particularly the application of the constant voltaic current to the suffering nerve. Iodide of potassium may also be given, although there is not much evidence to show that it really is useful in such cases. For peri-neuritis the same rules hold good as for neuritis, and are fortunately more effective in practice.

AUDITORY VERTIGO.

BY J. HUGHLINGS-JACKSON, M.D., F.R.S.

Physician to the London Hospital, and to the National Hospital for the Epileptic and Paralysed.

CASE I.—*Ocular Movements during a Paroxysm of Auditory Vertigo.*

THE following case is of interest with regard to the valuable experiments of Cyon. A critical account of these experiments has been given by Ferrier in the second number of 'BRAIN.' There is a paper on Cyon's observations by Croom Robertson in 'Mind,' October, 1878; and one by Crum Brown, 'Nature,' October 10th and 17th.

It will be best to refer first to a case already recorded by Schwabach ('Zeitschr. f. prakt. Med.' No. 11, 1878). I quote the following from Clarence Blake's Otological Review in 'Archives of Ophthalmology and Otology,' vol. vii., No. I., page 113.

"Schwabach reports a case of otitis media purulenta, accompanied by profuse discharge, with swelling and tenderness over the mastoid, severe vertigo upon pressure upon the ear, and in addition the following curious symptom.

"Upon pressing above and behind the auricle, the flow of pus was increased from the external auditory canal without increase of pain, but with marked oscillatory movements of both eyes, the eyes being turned towards the affected side, and slightly downward, the size of the pupils remaining unchanged.

"These movements ceased so soon as the pressure was removed, but were repeated in a lesser degree on syringing the ear. These movements were accompanied by vertigo, as

above mentioned. With the improvement in the disease of the ear, these peculiar symptoms gradually diminished. The author bases his explanation of the contraction of the muscles of the globe upon the experiments of Cyon upon rabbits, and assumes an irritation of the semicircular canals, in consequence of the pressure exercised upon the ear. The transmission of the irritation to the cerebral motor centres corresponding to the muscles is unexplained. The frequency of the oscillations was from 20 to 150 in the minute; their duration depended upon the pressure, but seldom exceeded half an hour."

The following is a note of my patient's case :—

Nov. 16, 1877.—A man, 25 years of age, had his first attack of vertigo four years ago. He was taken when apparently quite well (he was playing cricket) with giddiness; he did not become insensible; he vomited; he had a noise in his left ear. He has since been deaf of that side, but whether he was so before his first vertiginous attack or not he cannot be sure; he has had a continuous "humming" or "buzzing" (he used both words) noise in that ear ever since. During the last four months he has had many attacks.

At his first visit I had only his account of the paroxysm to go by. He said his attacks began by the left eye "being full of specks;" they were not bright nor coloured. Things (i. e. things in the room where he might be) began to pass to the right—he said "from his left eye over his nose." The same things kept passing continually in this direction; *reappearing* on the left, and again and again passing to the right: he did not see them *coming back*. He said that *next* he became giddy and vomited. There was one attack in which he declared that he lost consciousness; but apparently he really did not, as he said he knew people about him; he could not speak. This attack began suddenly: he was giddy, and vomited.

About a fortnight later I saw him again. He had had but one slight attack—"a hot sweat." Whilst telling me that he had been better, he became suddenly ill. I led him to the sofa, as he seemed apparently unable to stand. He lay half-reclining on the sofa. He looked very ill, and said he felt

giddy. I looked at his eyes about two minutes after he began to complain, or rather, I saw them moving, it not having occurred to me to look at them. What I saw is, I think, exactly confirmatory of what he told me on the previous visit, and of what he said after the seizure I witnessed. I asked no leading questions at any time. The pupils were very large, and the two eyes were in movement. Each eye was partially and very slightly rotated to the right in frequent jerks from left to right. The end of a mantelpiece was opposite him. I was much interested in hearing him *volunteer* the remark about the mantelpiece, that "it is going in this way" (he jerking his hand from left to right to show what he meant). After the brief time taken in writing down the above observations—I wrote them down at once—I found that the eyes were still: the mantelpiece had, he said, ceased "going" to the right. The attack was not a severe one. I guess its duration at ten minutes; his pulse was not irregular. I did not however feel it throughout. Towards the end of the paroxysm he perspired; his temperature in the axillas was normal. There was no sickness.

The observation was hurried. I had to attend to the patient as well as to observe his symptoms, but it is worth recording, if only to draw attention again to the desirability of making observations of the eyes during paroxysms of auditory vertigo.

Things I should try to observe, had I another chance, would be more carefully the nature of the jerks—the number in so many seconds. I should ask the patient to tell me how things outside moved, being very careful not to let him know how I expected them to move. Then, after the jerking movements had ceased, I should note whether there were any "negative after-movements of external objects," the analogue of "negative after-images." I made no inquiries in this case. It is possible that the mantelpiece might seem to be slightly moving in the opposite direction when the spasm was over. I ought to have tried to ascertain if my patient's eyes could move as far and as rapidly to the right as they could to the left. But in a bad case of auditory vertigo we should not, I fear, be able, on account of the great pros-

tration and misery of the patient, to make any precise observations.

The patient was much benefited, for a time at least, when the treatment advised for such cases by Charcot was begun—large doses of quinine.

On January 3rd, 1878, I prescribed four grains of quinine three times a day. On his next visit he said he had not been so well for four months. I saw him some months later; he said the quinine restored him wonderfully, and he took it when "a little queer." This queerness was "going a little giddy;" "things seeming to go" to the right. Moreover, he had had three stronger attacks.

I saw him again February 11th, 1879. He still has slight attacks. He now and then takes the quinine, which relieves him.

He now says that after a giddy attack he passes a large quantity of urine of a lightish colour.

On February 26th, 1879, Mr. Laidlaw Purves was so kind as to examine the patient's ears; the following is Mr. Purves' summary of an elaborate examination:—

"The membrana tympani is congested, but not more so than may be accounted for by the catarrh from which the patient is at present suffering, or by the constant concussions to which he is subjected during the exercise of his trade. Apart from the catarrh, congestion, and dulness of the sensation of the acoustic, the organ is healthy."

It is at first glance difficult to understand how it is that persistent changes in the ear, or changes which vary little, can be the cause of *paroxysms*. Sydney Ringer suggests that one factor in the development of the paroxysm of migraine is a diminished resistance of nervous centres. It may be, similarly, that the aural disease varies little, but that the attack is determined by diminished resistance of nervous centres during general enfeeblement of health. There are chronic cases of auditory vertigo, the patient being often a very little giddy, and scarcely perceptibly unsteady in his gait; in these certainly the vertigo varies with the general health, being worse when the patient is below par, and sometimes passing off altogether when he is invigorated by a well-spent holiday. The arti-

ficial invigoration by quinine may cure, or cure temporarily, by enabling the centres to resist the "irritations" starting from the ear. The occurrence of noises in the ear, after excessive doses of quinine, may perhaps be owing to exhaustion consequent on over-stimulation, and thus not be a fact discrepant with the opinion that large doses of quinine increase the resistance of nervous centres.

By a very superficial process of reasoning we might suppose that salicylate of soda in small doses might be a useful remedy in auditory vertigo; for in the doses given for rheumatic fever it causes great noise in the ear. We shall see that in the next case an illness during which salicylate was taken was followed by constant noise in a faulty ear; but the circumstances of this case are too complex for any exact conclusion to be drawn as to the action on the ear of the drug mentioned.

Several of my medical friends tell me, referring to my account of the paroxysm I witnessed, that the mantelpiece "ought to have appeared to move to the left—in an opposite direction to that of the eyes." That the eyes moved to the right I am sure; and the patient always told me that things passed to the right. I never asked him any leading questions. Until these objections were made, it never occurred to me that there could be anything incongruous betwixt his report and the direction of movements of his eye, and now I do not see anything discrepant.

CASE II.—*Noise in the Right Ear, with tendency to walk to the Left side, consequent on discharge of a heavily loaded gun near the Right Ear.*

My friend, Mr. Lewis Mackenzie, knowing my interest in Menière's disease, obtained for me details of a case which seems to me like an experiment bearing upon the production of certain symptoms of that disease. Mr. Mackenzie noticed when walking with, and to the left of a medical man (whom we shall henceforth call the patient), that he was gradually pushed to the left by the patient; on another occasion, the sides being reversed, he noticed that he was gradually pulled to the left. On inquiry, he found that the patient, in his gait, always tended to the *left*, and that he was deaf of the *right* ear.

Now for the history of these and other symptoms. The notes were taken by Mr. Mackenzie, February 1876. The case is all the more valuable in that the patient is a medical man, and in that the examiner into it is a methodical observer.

J. W., aged 34, surgeon, in very active practice, and apparently in perfect health, gives the following history:—

In October 1871 he was out shooting, and the birds being very wild, his host asked him to put in his gun some extra-loaded cartridges; this he did, but after firing his first two shots almost together with these heavily-loaded "pin-firing cartridges," he thought for a moment that his gun had burst, so great was the noise to him. For an appreciable interval of time, a moment or so, he felt giddy and "stunned," as it were, but immediately he recovered himself, and, on examining his gun, found it all right, and he walked on. At the discharge of the gun he did not fall, nor had he to grasp anything nor to ask any one to help him to stand; he did not vomit, nor even feel sick. But, as he began to walk on, he noticed that he had a "humming noise," a "frightful row," in his right ear, and that his right leg crossed over his left every time he put it forward, so that he could only with great difficulty walk straight. He finished his shooting, but only killed one more bird, as his aim was nearly always wrong. When he got home, he found that he was almost completely deaf of his right ear, and that there was in it a "buzzing," or a "humming like a bee."

This was a source of constant annoyance to him: he says it was so bad that it seemed, to use his own words, "to affect my memory, and for a time I could not recollect names nor add up any figures well. In the morning when I awoke it used to trouble me most, and then the sound was much higher pitched than after exertion. It has always been much more troublesome after a hard day's work, and especially after any wine-drinking or after smoking more than usual." The patient plays the violin, and has a very correct ear for musical tones; he says the noise has in no way affected the acuteness of his musical hearing. The noise is not altered when eating; and he thinks he has all along heard high-pitched or low-pitched sounds equally well, but has never tested the ears separately.

The giddiness and reeling in his gait towards the left side continued after the accident, more or less severely, for months, and occasionally for years, that is to the present time. It was much worse after any reduction in general health, whether that reduction was from a hard day's work or too much tobacco, &c.: objects did not appear to go round with him, but, he says, "I felt unsteady, obliged to take a step carefully for fear I should go to the left. I was quite conscious of exercising much care to counteract any reel to the left; but when I was at all tired I could not help it, and my wife often had to remind me that I was walking away to the left."

In May 1872, whilst staying at Heidelberg, and after walking fifteen miles in a hot sun, he began to suffer from severe pains in his head, with faintness and constant sickness; he vomited much mucus, &c., violently, and he shivered a good deal for a day or two. This acute head-attack lasted only about forty-eight hours, but left him much reduced in health and very weak for some days. Since that time the patient says he has been gradually improving; his hearing has greatly improved, but it is still impaired (in right ear). He only goes very slightly to the left in walking, and very rarely, and the auditory sensation only annoys him when he is considerably overtaxed.

The patient volunteered the statement that at times his pulse was irregular, and even intermitted as he often laid his finger on his radial, because his heart palpitated very much.

Feb. 4th, 1876. *Examination of the Patient.*—Heart normal, pulse regular, 68, never intermittent during a prolonged examination. Lungs normal; no evidence of abdominal disease; eyes normal; teeth perfect, &c. &c. When asked to stand with his eyes shut and his heels together, his body begins to sway in a circle; eventually *he goes back, and to left side,* to which side he moves his feet; this was extremely slightly marked, but was seen on several consecutive trials. In walking, with one eye shut at a time, no reeling occurred, but the patient expressed his consciousness of having to be careful to prevent going to his left; equally so whichever eye was shut. With both eyes shut he walked without noticeable reel, and well. *Ear.*—Hears watch 2 inches with left ear; $\frac{3}{4}$ inch with

right ear. Hears tuning-fork when placed on top of head best on side stopped up with the finger, but not so loudly on the right as on the left side. When tested with the violin, he estimates half-tones easily and quarter-tones fairly; and equally well in higher tones as in lower, with each ear.

The patient says that the sound in the right ear is now at times like the "thrill of a low-pitched harp-string after a sharp pull," a sort of twang. At times, it is just as if he had received a sharp box on the ear; at other times there are sounds like the chirping of small birds, in addition to the continuous sounds.

Examined with ear speculum, nothing coarsely abnormal is noticed in either ear. In the right ear, the membrane tympanum is flatter than in the left, not so convex exteriorly; no rupture of either, nor opacity.

I submitted the foregoing account by Mr. Mackenzie to the patient; he was good enough to send me the following. The whole case shows how much disability may result from what is primarily only an ear affection.

Feb. 1879.—"Although it is now eight or nine years since the date of my shooting, I have never been really comfortable in my head. The notes you have convey correctly my condition up to about this time last year. My partner had been away six months, and as the spring came on I felt the pressure of work. I had been feeling rather unwell, when one cold day I had to go into the country, and drove myself in my dog-cart; I had slight pain over the left parietal bone, at about midway at its junction with frontal bone. Suddenly everything became a brilliant scarlet colour; this passed off abruptly. The pain increased, and every now and then, when in a room, a greyish mist seemed to pervade the space, so much so that I thought it foggy or smoky. A few days later, I was attacked with a slight feverishness and restlessness at night; had to go out in the morning, but came back almost immediately with a splitting headache (in same place); took to my bed, and suffered extreme pain; temp. 103·5 in the night; had flying pains about limbs; took chloral to relieve pain; slept but little. Next day had fixed pain in both knees, and left eyeball and pain in head considerably better; temp. in morning 101 (4?).

Was too restless to stay in bed; got up and had return of pain in my head almost immediately, and relief from pain in knees; was a little delirious at night. Took a few doses of sod. salicyl. Next day better; collected my thoughts, fancied it was rheumatism, with metastasis to head. Had a profuse sour-smelling sweating. Got rapidly better, and went to work at the end of the week again.

"Now since then I have never known (*unless asleep*) *one moment's* freedom from noise of some kind in my head or ears, or right ear. I can give you this morning a fair idea of my present condition. Last night dined at 7, after a tolerably good day's work; plain dinner (and less than one glass of ale). After dinner did some reading, smoked one cigar, went to bed at 10.45. Slept tolerably well, as well as usual. In the morning (*as usual*) had that twang (harp-note twang, I call it) in my ear (right); at times it seems to come from the occipital region, and is sometimes so loud that, accustomed as I am to it, I have to listen to find out if it is not associated with some other sound. I can't tell you when this twanging sound goes off, it gradually disappears; but I am *never* without the singing sound (like that which follows a box on the ears). I mean *never*, and it sometimes worries me intensely. I have it occasionally in both, but when that is so, the sound in the left is higher pitched, less loud, not so much of it, and never so lasting. When I have the twang in my head at bedtime, which I often do, I can generally, not always, extinguish it by pressing my head (lying on the side affected) against the pillow; and I am in the habit of building the ends of my pillow up into a cone, and getting the full weight of my head concentrated in a point at the ear; directly I turn over the sound is as loud as ever, so I rarely sleep on my left side, for the sound is more than enough to keep me awake. I ought perhaps to tell you the two sounds constantly trouble me at the same time, and then the twanging sound consists of short and regular and frequently repeated sounds, about twenty-eight to the minute, as if a deep-toned harp-string was being repeatedly pulled, and I hear the vibration but not the note. At this moment, 11.30 A.M., my right ear is hissing and singing away merrily enough, and my right

eye feels full and moist, and my head heavy and dull; and were I to attempt any ordinary calculation, I should feel a swimming in my head, and it would require great mental effort to continue the calculation.

"If I stand now with my eyes shut, it is rather difficult to keep myself upright; and although I can't tell you which side I incline most to, I find myself, or fancy myself, trying to prevent my swaying in a circular direction. Can walk well with both eyes, or either eye, shut. My circulation is good, but easily excited; my bodily health is fairly good, but I am liable to phosphatic deposits in urine, generally associated with either sciatica or herpes. I don't think there is anything else I can tell you. These symptoms worry me a bit; and although I am as a rule very buoyant and easy-going, I fancy there is something that may develop into coarse brain disease. I told you that I thought sexual connection increased my symptoms. When I was first attacked, I used to syringe my ear, but it made me sick, and produced a stinging in my right eye. These symptoms I have told you of are very often, as they are *now* attended with a full heavy dull feeling in my head, and it seems to deaden my intellect, and render me powerless for consecutive thought. I am positive my memory is affected; and sometimes when I am conversing I can't find the word in ordinary use that I want."

NOTE ON A REFLEX MECHANISM IN THE FIXATION OF THE EYEBALLS.

BY W. R. GOWERS, M.D.,

Assistant-Professor of Clinical Medicine in University College.

THE phenomena of the fixation of the eyes by which, without conscious effort, they are kept directed to a given point, is attributed to a complex co-ordinating mechanism by which their movements are adjusted. The conditions of this fixation, however, suggest very strongly that its mechanism is not merely under the direction of a volitional centre, but that it is in part reflex. The motor impulses are constantly related to a sensory impression—that proceeding from the "fixing point" of the retina,—and analogy suggests that a reflex relation between this sensory impulse and the motor impulse may play an important part in the maintenance of the fixation. I am not aware that any recorded facts in physiology or pathology can be regarded as demonstrating the occurrence of such reflex action. The following observation, however, seems to constitute a proof of its existence.

A man who was lately under my care at the National Hospital for the Paralysed and Epileptic, on account of progressive muscular atrophy, with much rigidity, presented, during the last week of his life, the following symptom:—There was apparently a remarkable slowness in the movements of the eyes. If he was told to look at an object at a distance from that at which he was looking (of say 45°), his eyes were kept for a moment fixed upon the object he had been looking at, and were then slowly moved until they were fixed on the desired point. On closer examination, however, it was seen

that this was not merely a slowness of muscular movement. The head was instantly turned towards the object he was told to look at, while the eyes were kept fixed on the first object, and they slowly followed the movement of the head, until they were again in mid-position and fixed on the required point.

It is evident that the maintenance of the fixation of the eyes, while the head was quickly moved, involved a movement of the eyeballs as rapid and considerable as the movement of the head, but in the opposite direction, so as to maintain the fixation of the globes. This movement was evidently independent of, and even opposed to, the will, and opposed to the voluntary movement of the head, with which that of the eyes is usually associated. Its source cannot therefore be found in an influence originating in the centres. It must be ascribed to an afferent impression, and the only afferent impression concerned was that visual impression originating from the fixing-point of the retina. The phenomenon seems thus to demonstrate the existence of a reflex mechanism maintaining the fixation of the eyeballs, and capable of doing so during movements of the head. Usually, this mechanism is in such strict subordination to the will, that its existence, apart from the voluntary control, cannot be recognised. In this case it was dissociated from the voluntary action by a resistance to the voluntary control of the reflex centre, and its existence was thus manifested.

It is evident that such a reflex action must be of the greatest importance in maintaining the fixation of the eyeballs during movements of the head, with the least possible expenditure of voluntary action. Probably the mechanism for this reflex is made functionally active during infancy by repeated visual impressions, repeated waves of impulse along the afferent tract. In the young infant no fixation of the eyeballs is to be observed, but after repeated visual impressions have occurred for several weeks, an intense impression leads to a reflex fixation; the child's eyes follow a light. The seat of the reflex process is probably the corpora quadrigemina.

The analogy between this reflex inertia of the eyeballs, as it may be termed, and the muscular fixation or rigidity in the limbs, which was very conspicuous in the same patient, is

obvious. The movements of the limbs were slow, just as that of the eyes, and just as the movements of the limbs are in paralysis agitans. The analogy suggests that such muscular rigidity is, in part at least, reflex (the afferent impression probably proceeding from the muscles themselves), and that there is a separation of the reflex centre from the voluntary centre, or at least a resistance to the action of the latter, which is only slowly overcome.

ON THE WEIGHT OF THE BRAIN AND ITS COMPONENT PARTS IN THE INSANE.

BY J. CRICHTON-BROWNE, M.D., LL.D., F.R.S.E.,

Lord Chancellor's Visitor.

(*Continued from Vol. I., p.* 518.)

When considering the relative weights of the two hemispheres of the brain, it occurred to me that their ordinary relations to each other in this respect might possibly be reversed by disease of long standing. It seemed not improbable that the cortical centres which are last organised, which are the most highly evolved and voluntary, and which are supposed to be located in the left side of the brain, might suffer first in insanity, which consists essentially in reduction from a higher voluntary to a lower automatic sphere. And not only did it seem probable that these centres would be first invaded, but also that they would be most deeply implicated, and so that the anatomical changes which correspond with mental disease would advance more rapidly and further in the left hemisphere, in which voluntary movements have a leading representation than in the right, in which their representation is perhaps subordinate to that of automatic movements. In order to test this supposition, I selected from my 400 cases 32 in which the insanity was unmistakably acute in character, and of recent origin, and in which therefore atrophic changes consequent upon it, might be presumed to be nearly or altogether absent. I speculated that in these cases, in which the cerebral lesion must have consisted in abnormal rather than defective nutrition, I should arrive as nearly as might be at the state of matters; as regards the relative weights

of the hemispheres, which exists during health. These cases are summarised in Table IV., and it will be seen that in them the right hemisphere is still the heavier of the two.

TABLE IV.

TABLE showing the WEIGHT of the BRAIN and its COMPONENT PARTS, in 32 cases of the Acute Forms of Insanity.

No.	Whole Brain.	Right Hemisphere.	Left Hemisphere.	Cerebellum.	Pons Varolii.	Medulla Oblongata.	No.
	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	
Average . {	M. 1422·3	618·2	616·1	160·4	19·7	7·9	} Average.
	F. 1280·6	558·0	556·7	143·4	15·9	6·6	
	T. 1351·5	588·1	586·1	151·9	17·8	7·3	

Here the absence of atrophic changes is sufficiently evident, for the male brain in these 32 cases exceeds the male brain in the whole 400 cases by 87·6 grammes in weight, while the female brain presents an excess of 82·1 grammes. Whatever fallacy as to the weight of the hemispheres might therefore arise from these changes and their unequal distribution has now been got rid of, and yet we still find the right hemisphere ahead of the left one in weight. The differences between the two is 2·1 grammes for the male and 1·3 grammes for the female sex, and is not thus as great as that which separated them in the total number of brains examined, which was 3·7 for males and 2·1 for females. Nor is the proportion of cases in which the right hemisphere exceeded the left in weight as great as it was in the total number of cases, for in only 15 of the 32 cases was the right side of the brain the heavier. In 10 cases the left hemisphere was heavier than the right, and in 7 both were equal. Hence it might be urged that colour is given to the hypothesis that dextral pre-eminence in weight in the brain is a product of disease. But the superiority of the right hemisphere is still well marked, and the excess in weight of each hemisphere over that of the corresponding hemisphere, in the total number of cases, and in the 368 cases which remain after the 32 acute cases have been subtracted, is nearly the same in both.

TABLE V.

	Whole Brain.	Right Hemisphere.	Left Hemisphere.	Cerebellum.	Pons Varolii.	Medulla Oblongata.
	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	Grms.
Total Cases (400) .	1281·6	557·4	554·4	145·3	17·8	6·7
Acute Cases (32) .	1351·5	588·1	586·4	151·9	17·8	7·3
All others (368) .	1275·5	554·8	551·6	144·7	17·8	6·6
Excess of Weight in *Acute Cases*, as compared with all other cases (per cent.) . .	6·0	6·0	6·3	5·0	0·0	10·6

The facts, as far as they are at present ascertained, appear to me to point to the conclusion that in a large majority of persons, sane and insane, the right cerebral hemisphere is slightly heavier than the left one. There is at any rate no warrant for the belief which has gained currency, and contributed to the construction of some neat theories that the reverse holds good, and that the left hemisphere is the leading one, in bulk and weight, as well as in the initiation of voluntary movements. As will be subsequently pointed out, there are grounds for supposing that the two halves of the brain differ materially in development in different regions, and that with the gradually increasing asymmetry of the convolutions, which keeps pace with intellectual growth in the individual and the race, there goes a gradually increasing variation in the relative weights of the hemisphere. In a few of the lower animals on which I have made observations, the cerebral hemispheres do not differ in weight to an extent at all approaching what is seen in the human subject.

In confirmation of the opinion which I expressed that the difference in weight of the male and female brain is really greater than would be inferred from observations made on chronic lunatics, I would call attention to the fact that the sex difference in the acute cases in Table IV. is considerably greater than it is in the whole number of cases in Table I.:

in the latter case it is 136·2 grammes, in the former it is 141·7 grammes.

The heaviest brain amongst the acute cases was that of J. C., a youth who died of exhaustion during acute mania, at the age of 15, and was reported to have been remarkable for his precocious intellect, and powers of acquisition; his brain weighed 1605 grammes. The lightest was that of a female aged 22, who sank under pneumonia and erysipelas while labouring under puerperal mania; her brain weighed only 1133 grammes.

The average weights of the cerebellum given in Table I., which are 151·4 grammes for the male and 135·7 for the female sex, agree closely with those given by Dr. Boyd in his Somerset Asylum tables, which are 150·3 grammes for the male sex and 137·1 for the female. This organ increases steadily in absolute weight, and in weight relative to the total weight of the brain (see Table II.) in each decennial period of life till between 40 and 50 in males and 30 and 40 in females; and it would thus seem that it is in each sex about 10 years later in reaching maturity than the cerebral hemispheres. It would also seem that the cerebellum does not participate to anything like the same extent as the cerebral hemispheres in the loss of substance that is commonly associated with mental diseases, for it is at its greatest weight at those very periods of life when the hemispheres are most reduced in weight by the degenerative changes to which they are liable. This comparative immunity of the cerebellum from simple and numerical atrophy may perhaps throw light upon the rather startling conclusion arrived at by Dr. Skae and adopted by Dr. Thurnam, that the average weight of the cerebellum is somewhat greater in the insane than in the sane. It is of course possible that a derangement in the normal relations subsisting between the great and little brain may constitute one of the conditions predisposing to insanity, but we cannot accept this proposition without more convincing evidence than has as yet been adduced in its support.

The cerebellum is, as will be seen a little later, only comparatively and not altogether exempt from the pathological changes that accompany insanity. It obviously undergoes senile decay in as marked a degree as the hemispheres.

The greatest weight to which the cerebellum attained in the 400 cases included in my tables was 182 grammes. This it did in three cases, all males: that of T. M., No. 374, who died of sclerosis of the brain; that of J. C., No. 318, who died of pneumonia interrupting acute mania; and that of G. O., No. 299, who died of general paralysis. The lightest male cerebellum was that of G. O., No. 188, an epileptic dement, who laboured under chronic hydrocephalus, and died in the *status convulsivus*, in whom it weighed 108 grammes. The heaviest cerebellum amongst the females was that of E. W., No. 242, who died of pneumonia intercurrent in acute mania and Bright's disease, and in whom it weighed 173 grammes; and the lightest was that of E. P. O., No. 93, who died of heart disease, and in whom it weighed 93 grammes. The range of variation in weight is therefore proportionately greater in the cerebellum than in the cerebrum.

The cerebellum bears the same proportion to the weight of the hemispheres in the two sexes, at all ages taken together, but at different decennial periods the proportion varies considerably in accordance with the rule already laid down, that the hinder brain is fully evolved ten years earlier in women than in men. In both sexes it attains its fullest development at the prime of life, but before the time at which the mental faculties have mounted to their utmost vigour and cultivation, and in both it keeps pace in its decay with the failure of the vital activities of the body.

The pons Varolii is exceedingly constant in weight, and after attaining its full size, which it does at about twenty years of age, it varies but little during the remainder of life. It is apparently invulnerable to senile decay, which so markedly reduces the bulk and substance of other parts of the encephalon, for in my observations it actually weighed more after seventy years of age than it did between thirty and forty. It is involved also, but to a trifling extent, in the various encephalic changes connected with insanity. On reference to Table IV. it will be observed that it weighed in the thirty-two acute cases comprised in that table precisely the same that it did in the whole 400 cases comprised in Table I.

The largest pons Varolii encountered was in a male general

paralytic, J. S., No. 132, forty-four years of age, in whom it weighed 30 grammes (it weighed 29 grammes in one case, and 28 in three); and the smallest was in a case of chronic disorganisation of the brain, with numerous small old clots in a female, H. C., No. 180, aged sixty-eight, in whom it weighed just 8 grammes.

The medulla oblongata is also subject to but little alteration in weight at the different epochs of life. It reaches its maximum between twenty and thirty years of age, and after sixty it dwindles to a slight degree. The largest medulla oblongata observed weighed 14 grammes, this weight being attained in nine cases of varied character, seven males and two females, and the smallest observed weighed 3·5 grammes, this weight being reported in three cases.

In Table VI. the 400 cases which have been summarised in previous tables are so sorted as to set forth, as distinctly as may be, the manner in which the weight of the brain is affected by the various morbid conditions associated with the different varieties of insanity. I am not now concerned to defend the system of classification adopted in this table, which is not exhaustive, because it embraces only those forms of insanity in which there was a fatal issue in one or more of the 400 cases which I have under consideration, and which is open to many objections, scientific and practical. I have made use of it because the cases with which I had to deal readily lent themselves to arrangement under it, and because I think it will be unambiguous to those who are engaged in the treatment of the insane.

From this table we learn that there is a marked diminution in brain-weight in those forms of insanity that are classified under states of mental weakness, and that this applies to both sexes, but is especially true of the male sex. The average weight of the brain in all the forms of mental weakness taken together is 1312·3 grammes for the male sex, 1172·8 for the female, and 1263 for both sexes. But the average weight of the brain in all the forms of mental exaltation taken together is 1379·3 for the male sex, 1242 for the female, and 1316·1 for both sexes; and in all the forms of mental depression taken

TABLE

Table showing the Average Weight of the Brain and its Component Parts

		Forms of Mental Disease.	Both Sexes. Total Deaths.	Whole Brain.	Right Hemisphere.	Left Hemisphere.	Cerebellum.	Pons Varolii.	Medulla Oblongata.
				Grm.	Grm.	Grm.	Grm.	Grm.	Grm.
States of Mental Weakness.	Amentia	Idiocy	5	1101·4	489·2	461·0	129·6	15·6	6·0
		Imbecility	4	1246·9	548·4	538·7	137·3	16·3	6·2
	Dementia	Simple and Acute Dementia	22	1315·1	568·3	575·2	146·6	18·3	6·7
		Consecutive and Chronic Dementia	25	1265·4	552·3	542·8	145·6	18·4	6·3
		Organic Dementia	40	1261·3	547·4	547·3	142·8	17·4	6·4
		Paralytic Dementia	76	1225·4	526·9	523·8	149·6	18·1	7·0
		Epileptic Dementia	40	1330·2	583·2	582·7	140·5	17·2	6·6
		Alcoholic Dementia	1	1307·0	524·0	584·0	166·0	25·0	8·0
		Senile Dementia	56	1260·5	549·9	544·6	141·4	18·1	6·5
States of Mental Exaltation.	Mania	Pyrexial Mania	8	1310·7	571·8	570·9	143·9	16·9	7·2
		Simple Mania	3	1370·1	593·0	595·4	156·0	16·3	9·4
		Mania à Potû	1	1466·5	640·0	648·0	150·0	22·0	6·5
		Acute Mania	16	1378·3	599·9	594·7	159·5	17·9	6·3
		Puerperal Mania	3	1272·2	554·3	549·7	146·3	16·0	5·9
		Hysterical Mania	1	1283·1	567·0	560·0	135·0	14·0	7·1
		Recurrent Mania	5	1363·2	589·6	602·2	144·0	19·6	7·8
		Chronic Mania	50	1288·1	562·5	557·3	144·3	17·4	6·6
	Monomania	Monomania of Pride	10	1359·8	593·6	588·2	153·4	18·3	6·3
		Monomania of Suspicion	3	1191·7	518·7	513·3	137·3	17·0	5·4
States of Mental Depression.	Melancholia	Simple Melancholia	10	1303·2	572·9	562·1	143·1	18·2	6·9
		Acute Melancholia	6	1355·7	587·2	589·8	150·3	19·6	8·8
		Delusional Melancholia	12	1320·1	577·7	577·3	141·1	17·2	6·8
		Hypochondriacal Melancholia	3	1419·4	621·8	621·3	150·3	19·3	6·7

VI.

in 400 Cases of both Sexes, classified under 23 Forms of Mental Disease.

Males.							Females.						
Deaths of Males.	Whole Brain.	Right Hemisphere.	Left Hemisphere.	Cerebellum.	Pons Varolii.	Medulla Oblongata.	Deaths of Females.	Whole Brain.	Right Hemisphere.	Left Hemisphere.	Cerebellum.	Pons Varolii.	Medulla Oblongata.
	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.		Grm.	Grm.	Grm.	Grm.	Grm.	Grm.
3	1156·0	517·6	491·7	126·7	14·0	6·0	2	1019·5	446·5	415·0	134·0	18·0	6·0
2	1282·1	563·5	552·0	143·5	16·5	6·6	2	1211·8	533·5	525·5	131·0	16·0	5·8
12	1406·5	605·1	616·1	158·6	19·8	6·9	10	1205·4	524·2	526·2	132·2	16·5	6·3
17	1315·3	576·2	562·1	151·1	19·5	6·4	8	1159·5	501·4	501·9	134·1	15·9	6·2
21	1310·4	568·9	566·5	149·1	19·1	6·8	19	1207·1	524·0	525·9	135·7	15·5	6·0
60	1262·2	544·0	540·1	152·3	18·7	7·1	16	1087·7	462·5	462·5	139·9	16·0	6·8
26	1396·1	613·6	610·2	147·5	17·9	6·9	14	1207·9	526·6	531·7	127·4	16·0	6·2
1	1307·0	524·0	584·0	166·0	25·0	8·0	—	—	—	—	—	—	—
32	1319·1	576·0	570·2	147·7	18·3	6·9	24	1182·4	515·2	510·4	133·1	17 8	5·9
2	1440·1	623·5	620·0	166·5	19·5	10·6	6	1267·5	554·7	554·5	136·3	16·0	6·0
2	1420·6	616·5	616·5	159·5	17·5	10·6	1	1269·1	546·0	553·0	149·0	14·0	7·1
1	1466·5	640·0	648·0	150·0	22·0	6·5	—	—	—	—	—	—	—
10	1406·3	612·8	605·8	162·6	18·8	6·3	6	1331·8	578·5	576·2	154·3	16·5	6·3
—	—	—	—	—	—	—	3	1272·2	554·3	549·7	146·3	16·0	5·9
—	—	—	—	—	—	—	1	1283·1	567·0	560·0	135·0	14·0	7·1
3	1398·1	602·3	621·4	146·7	20·3	7·4	2	1310·8	570·5	573·5	140·0	18·5	8·3
17	1372·3	599·0	594·1	153·7	18·4	7·1	23	1189·4	519·8	514·0	133·3	16·3	6·0
7	1370·4	596·7	593·7	155·6	18·3	6·1	3	1335·2	586·4	575·3	148·3	18·3	6·9
2	1196·1	519·5	511·5	142·0	18·5	4·6	1	1183·1	517·0	517·0	128·0	14·0	7·1
5	1400·9	618·6	610·8	145·6	18·4	7·5	5	1205·6	527·2	513·4	140·6	18·0	6·4
4	1414·8	614·3	616·4	1[illegible]·3	20·3	8·5	2	1237·5	533·0	536·5	140·5	18·0	9·5
4	1481·8	650·2	651·7	152 [illegible]	20·8	6·8	8	1239·2	541·4	540·0	135·5	15·4	6·9
3	1419·4	621·8	621·3	150·[illegible]	19·3	6·7	—	—	—	—	—	—	—

together it is 1428·1 for the male sex, 1227·8 for the female, and 1331 for both sexes. And the contrast between states of mental weakness and those of mental exaltation and depression as regards the brain weights which are characteristic of them would be even greater than it is here represented to be, if two forms of insanity which are arranged under states of exaltation, viz. chronic mania and the monomania of suspicion, were placed in a separate division, or were transferred to states of mental weakness, which, for reasons to be hereafter mentioned, they might not improperly be. We should then have the following brain-weights for both sexes, corresponding with the three great divisions of mental diseases:

States of mental weakness	.	.	1263·0
„ „ exaltation	.	.	1344·1
„ „ depression	.	.	1331·2

It will be noticed that the weight here given for states of exaltation corresponds closely with that given for both sexes in the acute cases summarized in Table IV. Of course, a majority of these acute cases were instances of mental disease by exaltation, but a few instances of mental disease by depression were also included amongst the acute cases, as the point held chiefly in view in selecting these was not the specific character of the mental affection, but its speedy termination in death before necrobiotic changes had had time to interfere with the normal relations of the constituents of the encephalon. But in some of the cases classified under states of mental exaltation in Table VI., the mental disease had been of considerable duration, preserving, however, its essential characters to the last.

There is some difficulty in deciding whether the weight of the brain in states of mental exaltation, or that in states of mental depression should be received, as the nearest approach to the weight of the healthy brain. Doubtless in states of mental exaltation there is almost invariably hyperæmia active or mechanical of the whole brain, or of a segment of it, which is recognised after death as capillary or ramiform injection, and which must perceptibly augment the weight of the brain. But with the hyperæmia there goes increased tissue-waste and molecular disintegration, which must tend to

reduce the weight of the brain. The specific gravity of the blood, however, is considerably greater than that of the histological elements of the nerve centres, and the probability is that, as long as congestion lasts in the brain, its weight is slightly greater than it would be in a state of health. In states of mental depression, on the other hand, there is commonly anæmia, and some wasting consequent upon a deficient supply of suitable nutritive material. In acute melancholia, however, there is hyperæmia. Upon the whole, it would seem that the weight of the brain in states of mental depression is our best guide to the healthy standard of brain-weight. Perhaps that might be fixed at a point midway between the average weights for states of mental exaltation and depression.

Table VI. must convince us on the most cursory glance that insanity, taken as a whole, and when fatal, is associated with a diminished brain-weight. Under states of mental weakness there are marshalled (if chronic mania and the monomania of suspicion be included under these states) 322 of the whole 400 cases, and it is in these states of mental weakness that loss of brain-weight occurs. Under states of mental exaltation and depression, in which the brain-weight is maintained somewhere near the normal standard, the whole number of cases is only 78. We may dismiss, therefore, without further refutation, the statement of Parchappe that insanity has the effect of increasing the weight of the brain, and that of Skae that "the average weight of the brain is increased in persons dying insane." It may be taken as proved that insanity on the average of any considerable number of cases reduces brain-weight, and we have certainly no evidence to justify the theory that those who are attacked by insanity are of superior cerebral development to the rest of the community who escape mental disease. The multiplicity and diversity of the causes by which insanity is produced are of themselves sufficient to negative this theory.

Proceeding to analyse Table VI. a little more minutely, we perceive that the lowest brain-weights recorded are those connected with states of amentia, or original privation of the mental powers, in which it is not degeneration but arrested

growth of the brain, that is responsible for its inferiority in weight. The five idiots and imbeciles whose brains were examined were by no means of the lowest type, and hence the average brain-weight given under this heading is not to be taken as an average for the class.

The next lowest average brain-weight to that found in amentia, is discovered after a long and unexpected leap under the monomania of suspicion—a state of mental exaltation. But the three cases included under this heading in my table ought perhaps to have been transferred to that of alcoholic dementia, for in all of them those dangerous delusions of conspiracy and persecution, which are in certain persons the offspring of long-continued intemperance, had after a protracted course merged into a general deterioration of the faculties. In all of them, however, the delusions could be recognised until the end, which was immediately brought about, not by the cerebral changes but by pelvic abscess, pneumonia, and bronchitis, and hence their classification as monomania of suspicion. Only one case of alcoholic dementia is included in the table, and that not a peculiarly characteristic one; but a reference to notes of other cases convinces me that in this form of insanity the brain wasting is extreme.

Next to the monomania of suspicion, in ascending the scale of brain-weights comes paralytic dementia or general paralysis, in which, in both sexes, there is pronounced cerebral atrophy. The shrivelling of the cerebrum, and more particularly of the gyri of the frontal and parietal lobes in this malady is all the more remarkable, because the patients who die of it are mostly at the zenith of life, when the brain ought to be at its greatest weight. In the West Riding Asylum it is believed that as much as it was practicable to do, was done in the way of careful nursing and medical treatment to draw out the malady to its utmost possible extent; and thus no doubt brain wasting was carried in the cases included in this table to the furthest point, which is compatible even with vegetative life.

Immediately above paralytic dementia stands organic dementia in the scale of brain-weights, in which the whole brain was 1310·4 grammes in men, and 1207·1 in women. In this disease there is not only attenuation of the gyri, but

softening of the cerebral substance in the neighbourhood of old clots or embola, not large enough at once to extinguish life.

Consecutive and chronic dementia, a form or forms of mental disease, embracing so many of the inmates of our lunatic hospitals, whose nervous systems have been irreparably damaged by the acute storms of disease, or who have subsided quietly into the depths of fatuous degeneration, is represented in Table VI. by a brain-weight only a shade greater than that of organic dementia; the average for males being 1315·3 grammes, and for females 1159·5 grammes. Senile dementia, the result of atheromatous changes in the vessels without rupture, and clot, or the expression of the results of life-long wear and tear in nervous processes, has a brain-weight of 1319·1 grammes for males, and of 1182·4 for females. In both chronic and senile dementia, the loss of brain-weight is proportionately greater in the female than in the male sex.

Simple and acute dementia—two distinct but allied forms of mental disease, here for convenience grouped together—give an average brain-weight of 1406·5 grammes for males, and 1205·4 for females, that is to say, 1315·1 for both sexes. Here, therefore, the loss of brain-weight has been comparatively small. Under simple and acute dementia are arranged some of the mildest cases of mental impairment that find their way into a lunatic hospital, and some cases of sudden and sharp, but short-lived mental prostration.

Of all the forms of mental weakness, epileptic dementia has the greatest brain-weight in both sexes. Doubtless the ultimate tendency of epilepsy is to induce atrophy of the brain, which is seen when death takes place during epileptic stupor, although even then the wasting is by no means as advanced as it is in other forms of dementia; but primarily epilepsy tends to set up a state of induration or even hypertrophy of brain. Then in the cases of epilepsy that are cut short by accident, as by suffocation, or that terminate in a fit or in the *status epilepticus*, there is frequently great cerebral congestion, which adds materially to the weight of the brain when it is placed in the scales. A large proportion of asylum epileptics are in the most advanced stage of the disorder, and die in the state of

stupor, so that the brain-weights given in Table VI. must not be taken as criteria for those of epileptics in general.

Amongst the states of mental exaltation, the brain-weight is high in pyrexial, simple, and acute mania, and low in chronic mania. In the last-named form of mental disease, a primary acute attack of madness, and subsequent mental excitement and disorder of long continuance, extending often over many years, have unquestionably deteriorated the brain in all respects, and diminished its weight. Chronic mania tends, in the course of time, to merge into chronic dementia, and I ought perhaps to have followed Griesenger and grouped it with states of mental weakness. A certain limited persistence of spontaneity and mental and bodily activity, in the cases classified as chronic mania, and the absence of the progressive degeneration which is characteristic of dementia, induced me to retain these cases amongst states of mental exaltation, to which they all indisputably at their outset belonged. In arranging my cases under the different forms of mental disease enumerated in Table VI., I have not trusted to anything so treacherous as entries in Registers, returns to Commissioners, or diagnoses made at the time when the patient was brought under care. In each case, I have reviewed its whole history, and have classified it in accordance with that, giving particular regard to the symptoms presented at the time of death.

In recurrent mania and the monomania of pride, there is evidence of slight brain-wasting in the male, but of none in the female sex. In the single case of mania à potû, the patient, who was naturally possessed of a good brain, died during delirium tremens, and his nerve-centres were found much congested.

It is in states of mental depression, as I have already argued, that the brain is found in a condition most nearly approaching to normal integrity. Melancholia is, in its milder forms, a mere functional disturbance, and even when it assumes a severer type, and is connected with structural changes in the great nerve-centres, these are not of a severity at all comparable with what occurs in states of mental weakness or exaltation. When death happens in melancholia it is but rarely that it is attributable to any encephalic condition. Almost invariably

it is due to visceral or constitutional diseases that are only indirectly dependent upon the primary neurosis and that do not seriously interfere with cerebral nutrition. Thus in only one of the thirty-one cases of death during melancholia, included in Table VI. was brain disease the cause of death. Phthisis was the cause of death in five of these cases; pneumonia in four; bronchitis in three; pleurisy in four; heart disease in three; Bright's disease in four; and general tuberculosis, ulceration of the intestines, cancer of the breast, cancer of the uterus, pyæmia, erysipelas, and diarrhœa in one each; and it is certainly remarkable that in sixteen out of thirty-one cases of melancholia, disease of the lungs and its covering should have been responsible for a fatal termination. But the diseases enumerated, whether of the lungs or other organs, produce comparatively little wasting of the cerebrum and its appendages, and hence the brains of melancholics, of all brains examined in the post-mortem room of a lunatic hospital, most closely resemble the healthy brain in all respects. There may be slight wasting or slight engorgement in acute melancholia; there may be intense injection of the grey matter of the hemispheres in certain areas; but as a rule, the encephalic structures do not present those coarse alterations which are so obvious in dements and maniacs. Bearing this in mind, it is instructive to notice that in the brain of melancholics included in Table VI., the sex difference in weight is much more pronounced than in the brains of lunatics who suffered from other varieties of insanity. In melancholics this difference amounts to 200·3, whereas in the whole number of the brains weighed it was 136·2 grammes.

The fact that the brains of melancholics, which of all lunatic brains are most like those of sound-minded people, exhibit the largest ratio of sex difference, is certainly corroborative of the view taken in an earlier part of this paper, that insanity tends to level down the sex difference, and that the male brain on an average exceeds the female brain in weight in an amount considerably greater than these estimates which have been formed upon lunatic asylum statistics would lead us to believe.

The only point in connection with the differences in brain-

weight in the sexes in the various forms of mental disease which it is important to notice is, that throughout the states of mental weakness, the loss of weight sustained by the brain in the female sex is vastly less than that which it suffers in the male sex. The difference between the greatest and the least brain-weight recorded in Table VI., exclusive of states of amentia, is 270·4 grammes for the male sex and 172·3 for the female, a fact which indicates the much greater severity of the pathological vicissitudes to which the male organ is exposed.

The number of cases falling to each particular form of mental disease in Table VI. is so small that no profit could accrue from arranging them with reference to age at the time of death.

As regards the relative weights of the cerebral hemispheres in the twenty-three forms of mental disease enumerated, the following observations may be made, with the qualification that the number of cases is too minute to warrant anything more than a mere suggestion in each instance.

1. In states of amentia the right is heavier than the left cerebral hemisphere in both sexes.

2. In senile dementia the right hemisphere preponderates in both sexes.

3. In simple and acute dementia the left hemisphere preponderates in both sexes.

4. In paralytic and epileptic dementia the right hemisphere is heavier than the left one in the male, while in the female sex they are nearly equal.

5. In chronic mania the right hemisphere is markedly heavier than the left in both sexes.

In the dementia of general paralysis the cerebellum does not share to anything like a full extent in the wasting by which the cerebrum is so seriously reduced; indeed, the cerebellum is less wasted in the dementia of general paralysis than in any of the other chronic forms of dementia, while the cerebrum is more wasted than in any other form of mental disease without exception. The average weight of the cerebellum in general paralysis is 152·3 grammes in males, and 139·9 in females, while the average weight at all ages for all the 400 cases was 151·4 for males, and 137·7 for females. What may be the significance of this comparative immunity of the

cerebellum from the destructive changes which so rapidly and extensively denude and degrade the cerebrum in this malady, we are not yet in a position to suggest.

In striking contrast with the weight of the cerebellum in general paralysis is its weight in epilepsy; there the cervelet is of inordinately small weight in both sexes, while the cerebrum is of great weight in comparison with its weight in the other chronic forms of dementia. That there is often wasting of the cerebellum in epilepsy is unquestionable; but whether the whole of the deficiency of weight in this organ in epileptics, which amounts to 11·4 grammes for both sexes short of the average weight recorded for acute cases, is to be ascribed to wasting, or whether some of it may not be attributable to arrested development, I am not prepared to say.

In acute mania in both sexes the cerebellum is of great weight, absolutely and relatively to the weight of the hemispheres; and, indeed in almost all the forms of mental exaltation and depression the weight of the organ contrasts notably with what is seen in states of mental weakness.

But little variation is observable in the weight of the pons Varolii and medulla oblongata in the several varieties of mental disease.

Of the 400 patients whose brains I examined, twenty-five males and nineteen females, forty-four in all, died of phthisis pulmonalis. The weights of their brains, separated from the others, and subjected to calculation, give the results shown in Table VII.

TABLE VII.

TABLE showing the WEIGHT of the BRAIN and its COMPONENT PARTS in 44 Cases of Phthisis (25 Males and 19 Females).

No.	Age.	Whole Brain.	Right Hemisphere.	Left Hemisphere.	Cerebellum.	Pons Varolii.	Medulla Oblongata.
		Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.
Average	Males .	1372·0	599·5	598·1	149·6	17·9	6·9
	Females	1234·5	535·8	538·7	136·8	16·9	6·3
	Total .	1312·6	572·0	572·4	144·1	17·5	6·6

It appears that the brains of the phthisical are wasted to a certain extent. They fall short in weight of the brains in acute cases to the extent of 50·3 grammes in the male and 46·1 in the female sex, but they transcend the general average of the whole 400 cases to the extent of 24·3 grammes for the male, and 26 for the female sex. The forms of insanity from which these phthisical patients suffered was perhaps more instrumental in determining the brain-weight than their diathesis or lung disease. Eighteen of the forty-four laboured under chronic mania, six under epileptic dementia, six under chronic dementia, five under mania (simple, acute, and puerperal), four under melancholia, three under idiocy and imbecility, and two under delusional insanity.

In carrying out my researches as to brain-weights, it soon became evident that in tracing the relations of the size and weight of the cerebrum to the intellectual power of the race, or of the individual in health and disease, it was necessary to obtain information as to the relative weights of the lobes of which each hemisphere of the brain is composed. On this subject no information has hitherto been published, so that I had to undertake an original investigation in order to obtain it. This I did in 1875, extending my observations on the brains which I examined to the weight of the lobes, as well as of the hemispheres. My observations were, however, broken off when I had weighed the lobes separately in only sixty brains. The results obtained from these sixty brains are here set forth, not as supplying any definite standards of comparison, but simply as furnishing certain general indications that are not without value and significance.

The weighing of the cerebral lobes was conducted as follows:—

The brain having been denuded of its pia mater, and the hemispheres having been separated and weighed in the manner already described, each of them was laid on its flat inner surface on a board, and was treated in the following manner. The ascending frontal and ascending parietal gyri were carefully separated from each other by the fingers of the left hand of the operator, and a large and long brain-knife was introduced between them, and being held perpendicular to the

board and in the line of the sulcus, was made by one clean cut to separate the frontal lobe from the rest of the brain. The remainder of the brain being then turned over, a second incision was made in the line of the internal parieto-occipital fissure, up to the part where it is crossed by the calcarine fissure, in the line of which the third incision was made, so separating from the cerebral mass a portion which might be roughly taken to correspond with the occipital lobe. The remainder of the brain being again turned over, the last cut was made in the line of the horizontal limb of the Sylvian fissure, and severed the temporo-sphenoidal from the parietal lobe.

It need not be said that this was a somewhat unsatisfactory method of partitioning the brain, and was adopted simply because none better could be devised. The lobes of the brain are not separated from each other by scientific frontiers, but by arbitrary lines, and the existence of secondary gyri often renders it difficult to trace out their boundaries with sufficient exactness. Great care was, however, taken to pursue precisely the same method of subdivision in each case. It might have been more satisfactory had I followed Gratiolet, and made the ascending limb of the Sylvian fissure the posterior boundary of the frontal lobe, for more of Ferrier's motor region would then have been included in the parietal lobe. But the fissure of Rolando is less apt to be interrupted by secondary gyri than the ascending limb of the Sylvian fissure, and forms therefore a better line of division; and whatever may be the functional relations of the ascending frontal gyrus, it is certainly in intimate morphological connection with the three tiers of frontal gyri, as is evident in the fœtal brain, and in the brains of the Simiæ, while it is sharply marked off from the ascending parietal gyrus. I think some interesting results would be obtained by weighing separately, in a large number of cases, sections of the cerebrum separated from each other, not in the lines of sulci, but in straight lines, at fixed distances from given points.

Tables VIII. and IX. (pp. 60, 61) exhibit the general results of my weighings of the cerebral lobes:—

TABLE VIII.

TABLE showing the AVERAGE WEIGHT of the BRAIN and its COMPONENT PARTS, in 60 Cases, of both Sexes; 31 Males and 29 Females.

	Whole Brain.	Right Hemisphere.					Left Hemisphere.					Cerebellum.	Pons Varolii.	Medulla Oblongata.
		Total of Right Hemisphere.	Right Frontal Lobe.	Right Parietal Lobe.	Right Temporal Sphenoidal Lobe.	Right Occipital Lobe.	Total of Left Hemisphere.	Left Frontal Lobe.	Left Parietal Lobe.	Left Temporal Sphenoidal Lobe.	Left Occipital Lobe.			
	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.	Grm.
Males . .	1329·3	581·5	245·7	131·8	131·7	72·3	576·5	238·3	139·9	132·0	66·3	147·2	17·5	6·6
Females .	1183·5	510·7	217·3	116·3	114·8	62·3	513·7	212·5	121·1	118·8	61·3	137·2	15·9	6·0
Total . .	1258·8	547·3	232·0	124·3	123·5	67·5	546·1	225·8	130·8	125·6	63·9	142·4	16·7	6·3

TABLE IX.

TABLE showing the RELATIVE WEIGHTS of the COMPONENT PARTS of the BRAIN to the total Brain-weight (assumed to be 1000).

Averages of 60 Cases of both sexes; 31 males and 29 females.

	Whole Brain.	Right Hemisphere.					Left Hemisphere.					Cerebellum.	Pons Varolii.	Medulla Oblongata.
		Total of Right Hemisphere.	Right Frontal Lobe	Right Parietal Lobe.	Right Temporal Sphenoidal Lobe.	Right Occipital Lobe.	Total of Left Hemisphere.	Left Frontal Lobe.	Left Parietal Lobe.	Left Temporal Sphenoidal Lobe.	Left Occipital Lobe.			
Males . .	1000·0	437·4	184·8	99·1	99·1	54·4	433·7	179·3	105·2	99·3	49·9	110·7	13·2	5·0
Females .	1000·0	431·5	183·6	98·3	97·0	52·6	434·1	179·6	102·3	100·4	51·8	115·9	13·4	5·1
Total . .	1000·0	434·7	184·3	98·7	98·1	53·6	433·9	179·4	103·9	99·8	50·8	113·1	13·3	5·0

The first point to be noted in Table VIII. is that the weight of the whole brain in the sixty cases included in it is considerably less than that of the whole brain in the 400 cases which were dealt with in the earlier part of this paper. In the 400 brains the average weight of the whole in both sexes was 1281·6 grammes, whereas in the sixty cases it was 1258·8, showing a deficiency of 22·8 grammes in the latter. This discrepancy is accounted for by the fact above mentioned, that the cerebral hemispheres, which were divided into lobes, were entirely stripped of their pia mater. The removal of this membrane and the escape of fluid from the surface of the cerebrum during its removal reduced the brain-weight in the sixty cases in which the lobes were weighed to the amount indicated. The loss of weight, as was inevitable under such circumstances, was distributed over all parts of the brain, and occurred in both sexes, though from some cause, which is not clear, it was much more marked in the brains of females than in those of males.

The second point deserving attention is the large relative weight of the frontal lobes, which make up about two-fifths of the weight of each hemisphere. Of course these lobes include the islands of Reil, which may be regarded as the starting-points of the frontal convolutions, and which it is impossible to dissect away from surrounding parts in such a manner that they might be weighed separately with any approach to trustworthy results. As the frontal lobes in man may be regarded as generally homologous with those regions at the anterior extremities of the hemispheres in the monkey which give negative results when subjected to electrical irritation, and with those small cerebral masses which in the dog and cat lie in front of the anterior limb of the sigmoid gyrus, it is evident that they attain in the human subject to a degree of development that must be pronounced enormous.

The third noteworthy point is that the frontal lobes in both sexes bear about the same proportion in weight to the other lobes of the cerebrum. Preconceived ideas might have led us to anticipate that these lobes would be found to be lighter in proportion to the rest of the hemispheres in women than in men; but this is not so. It may be that they are in some

respects less highly developed, that they are less richly convoluted, that their grey matter is shallower, that their ganglion-cells are less freely branched, or that their blood supply is less copious; but this, at any rate, is tolerably clear, that these lobes are not inferior in weight, in proportion to the weight of the brain as a whole, in women, to what they are in men. This is clearly indicated in the following table, which exhibits the average relative weights of the frontal lobes as contrasted with the weights of the other lobes in each hemisphere, the whole weight of each hemisphere being assumed to be 1·000 grammes.

TABLE X.

TABLE showing the PROPORTION of the FRONTAL LOBES, and of the remaining LOBES, to the total weight of the Right and Left Hemispheres respectively (assumed to be 1·000).

	Right Hemisphere.			Left Hemisphere.			
	Total of Right Hemisphere (assumed to be 1·000).	Proportion of Right Frontal Lobe.	Proportion of the Remaining Right Lobes.	Total of Left Hemisphere (assumed to be 1·000).	Proportion of Left Frontal Lobe.	Proportion of the Remaining Left Lobes.	
Males .	1·000	·423	·577	1·000	·413	·587	Males
Females	1·000	·426	·574	1·000	·414	·586	Females
Total .	1·000	·424	·576	1·000	·414	·586	Total

Among males the proportion that the right frontal lobe bears to the sum of the three other right lobes is as 423 to 577; the right frontal lobe is therefore equal to ·423 of the total weight of the right hemisphere. Similarly the left frontal lobe is to the sum of the three other left lobes as 413 to 587, and is equal to ·413 of the total weight of the left hemisphere. Among females the proportion that the right frontal lobe bears to the sum of the other right lobes is as 426 to 574; the right frontal lobe is therefore equal to ·426 of the total weight of the right hemisphere. Similarly, the left frontal lobe is to the sum of the three other left lobes as 414 is to 586,

and is equal to ·414 of the total weight of the left hemispheres. The share taken by the frontal lobes in the composition of the cerebrum would seem, therefore, to be slightly greater in females than in males; but if allowance be made for an excess in the number of cases of general paralysis and organic disease of the brain, in which the frontal lobes are invariably much wasted, amongst the thirty-one males included in the sixty cases upon which the table is founded, it may, I think, be fairly said, that the frontal lobes hold an equal proportion in weight to the other lobes of the brain, and to the whole weight of the hemispheres in both sexes.

A third point calling for remark is, that in both sexes the parietal and temporo-sphenoidal lobes were heavier on the left than on the right side, while in both sexes the frontal and occipital lobes were heavier on the right than on the left side. The sum of the left parietal and temporo-sphenoidal lobes exceeded the sum of the same lobes on the right side by 9·8 grammes in the male and by 8·8 grammes in the female sex, while the sum of the right frontal and occipital lobes exceeded that of the same lobes on the left side by 13·4 grammes in the male and by 5·8 in the female sex. The preponderance of the left parietal and temporo-sphenoidal lobes over the corresponding lobes of the other side in the female sex, is so much greater than the preponderance of the right over the left frontal and occipital lobes, that the relation of the two hemispheres is affected, the left being in the cases comprised in this table actually 3 grammes heavier than the right. In the male sex, however, the preponderance of the right frontal and occipital lobes is more than sufficient to counterbalance the preponderance of the left parietal and temporo-sphenoidal, so that the right hemisphere remains 5 grammes heavier than its fellow of the opposite side. In this connection it is important to observe, that in the 400 cases in which the hemispheres were weighed, the preponderance of the right over the left hemisphere was much less decided in the female than in the male sex, having been only 1·8 grammes in the former against 2·8 in the latter; and it may, perhaps, be suggested that this was due to the fact that the left parietal and temporo-sphenoidal lobes exceed those of the left side in a greater degree, while the

right frontal and occipital lobes exceed their fellows of the opposite side to a less degree in women than in men. It would appear that the tendency to symmetry in the two halves of the cerebrum is stronger in women than in men.

The pronounced excess in weight of the left over the right parietal lobe in both sexes, amounting in men to 8·1 grammes, and in women to 4·8 grammes, is very significant. These lobes, as weighed in my observations, include a large part of Ferrier's motor areas; and it is therefore interesting to find the lobe of the left side, in which the various volitional motor acts are supposed to have a leading representation, surpassing that of the right side so unmistakably in development. The muscles of the right side of the body being principally concerned in voluntary motor performances, we should expect the motor centres of the left hemisphere, which are more especially the organic basis of motor acquisitions, to be more highly educated and developed than the corresponding centre of the opposite side. And the results to which attention has just been directed are in harmony with this expectation. Then, again, in men who are engaged in handicrafts requiring skill and dexterity to a much greater extent than women, and in whom righthandedness is, I believe, more marked in degree, we should expect the motor centres of the left hemisphere to be more highly developed than in women. And again the figures confirm our preconceptions; for the left parietal lobe exceeds the right one by 8·1 grammes in weight in men, and only by 2·8 grammes in women.

Had a different system of partitioning the brain to that which I adopted been pursued, perhaps even more striking results would have been obtained, and certainly more trustworthy data would have been collected bearing upon the researches of Hitzig and Ferrier. In my observations, a large portion of the motor tract, the ascending frontal, and the posterior ends of the three tiers of frontal gyri were included in the frontal lobes. I am confident that a sufficiently extended series of brain-weighings, after a carefully designed scheme, will conduct to valuable conclusions. It is practicable for the unaided eye to discover in a majority of brains a distinct difference in Broca's convolution on the two sides; a bulging and fulness

TABLE XI.

TABLE showing the AVERAGE WEIGHT of the BRAIN and its COMPONENT PARTS, in 60 Cases, of both Sexes, at different Ages.

Ages.	Whole Brain.	Right Hemisphere.			Left Hemisphere.			Cerebellum, Pons Varolii, and Medulla Oblongata.
		Total of Right Hemisphere.	Right Frontal Lobe.	R. Parietal, R. Temp. Sph., and R. Occipital Lobes.	Total of Left Hemisphere.	Left Frontal Lobe.	L. Parietal, L. Temp. Sph., and L. Occipital Lobes.	
	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.
All Ages	M. 1329·3	581·5	245·7	335·8	576·5	238·3	338·2	171·3
	F. 1183·5	510·7	217·3	293·4	513·7	212·5	301·2	159·1
	T. 1258·8	547·3	232·0	315·3	546·1	225·8	320·3	165·4
Under 20	M. 1149·0	534·0	228·0	306·0	481·0	199·0	282·0	134·0
	F. ——	——	——	——	——	——	——	——
	T. ——	——	——	——	——	——	——	——
20–30.	M. 1408·4	616·0	255·3	360·7	616·9	246·2	370·7	175·5
	F. 1160·5	504·0	233·0	271·0	492·0	201·0	291·0	164·5
	T. 1372·9	600·0	252·1	347·9	599·0	239·7	359·3	173·9
30–40.	M. 1328·3	572·0	237·7	334·3	578·7	238·5	340·2	177·6
	F. 1230·6	531·3	225·6	305·7	535·4	213·9	321·5	163·9
	T. 1266·1	546·1	230·0	316·1	551·2	222·8	328·4	168·8
40–50.	M. 1296·8	564·8	240·3	324·5	564·4	235·0	329·4	167·6
	F. 1131·5	486·7	215·0	271·7	486·3	214·0	272·3	158·5
	T. 1251·6	543·4	233·4	310·0	543·1	229·3	313·8	165·1
50–60.	M, 1317·3	574·4	243·0	331·4	567·0	234·2	332·8	175·9
	F. 1161·7	494·9	208·3	286·6	504·3	210·9	293·4	162·5
	T. 1217·3	523·3	220·7	302·6	526·7	219·2	307·5	167·3
60–70.	M. 1349·2	595·5	255·5	340·0	579·5	246·8	332·7	174·2
	F. 1181·3	515·9	216·3	299·6	514·4	213·0	301·4	151·0
	T. 1242·3	544·8	230·5	314·3	538·1	225·3	312·8	159·4
70 and upwards.	M. 1313·5	579·3	249·0	330·3	568·7	239·3	329·4	165·5
	F. 1213·7	530·5	227·0	303·5	529·0	216·5	312·5	154·2
	T. 1273·6	559·8	240·2	319·6	552·8	230·2	322·6	161·0

of the hinder part of the third frontal convolution on the left side, which has no counterpart on the right; and I cannot doubt that differences of a very significant character, and appreciable by the scales, would be revealed in various regions of the two hemispheres.

In two cases in which the right frontal lobe was heavier than the left, I have unfortunately been unable to ascertain whether the patient had been left-handed.

In Table XI. the weight of the frontal lobes is contrasted with that of the sum of the other lobes at different ages; but the number of cases available for arrangement in the several decades is far too small to enable any trustworthy average to be struck. The table suggests, however, that the relation as regards weight between the frontal and other lobes is maintained without material alteration throughout adult life and old age.

Critical Digests and Notices of Books.

The Hystero-neuroses. By GEORGE J. ENGELMANN, M.D. St. Louis, M.O. Reprint from Vol. II. of 'Gynæcological Transactions,' 1878.

HYSTERO-NEUROSES is the name given by the author of the above paper to a series of nervous phenomena which occur in different parts of the body as a result of uterine irritation. Morbid conditions of the womb, both functional and structural, he maintains, cause such primary local excitement, as by reflex action induce secondary perverted function in various distant parts. The organs thus affected are not structurally changed, and the symptoms disappear on the cessation of the uterine disorder. The subjects of such afflictions are not as a rule hysterical, and the phenomena are not to be looked upon as belonging to that disease. It is pointed out, for example, that there is a close relation between psychological changes and disorders of the womb. It is stated that, in a large majority of women mentally affected, there are menstrual irregularities. Cases are given where epilepsy originated from cervical erosions, and which recovered after this disease was removed. In the same way melancholia, hypochondriasis, and other forms of insanity were caused by uterine displacements and disease, and they disappeared when these last were cured. The author further proceeds to show that affections of the eye, pharynx, larynx, bronchi, breasts, intestines and joints, may in the same way be associated with uterine disease, which he maintains causes these disorders entirely by reflex irritation. He enters more particularly into the effects produced on the stomach through this agency. He points out how common the symptom of dyspepsia is in those persons

suffering from disease of the womb, who are menstruating, or who are pregnant, and draws from this the conclusion that this is due to the effects of uterine irritation.

Dr. Engelmann's paper deals with a most important and interesting subject, with the nature of which we are as yet little acquainted, and a question which at the present time is attracting much attention amongst those working at nervous physiology and pathology. In criticising the views of the author, it must be at once conceded that his statements are to a certain extent probably correct, that many of the reflex phenomena which occur in women may have for their origin some irritation of the uterus, and that when this excitement is removed the nervous symptoms cease. The question, however, arises, is the uterus *per se* the only cause which may give rise to the spasms, convulsions, &c., which are said to be produced through its influence? We venture to doubt such a theory. Irritation to any peripheral sensory nerve may under certain circumstances induce reflex acts which manifest themselves by a variety of nervous phenomena in different parts of the body. An injury to the finger, for example, may result in tetanus or epilepsy; from teething there follow convulsions; worms in the intestines give rise to the same; renal, vesical, and hepatic calculi originate both motor and sensory disturbances. It is therefore not remarkable that an irritation of so important an organ as the uterus should be the starting-point of nervous reflex symptoms. Nay, considering how liable the womb is to functional as well as structural disorder, how important a part it plays in the psychical as well as in the physical well-being of women, it may be admitted that of all the nervous affections which follow peripheral irritation the majority arise from this source, simply because the uterus is perhaps the most important organ in the female economy, and the one which is the most frequently diseased. But we question whether uterine irritation in its effects differs in other respects from excitement of any other sensitive nerves, or that it induces any special or characteristic symptoms. An inquiry describing the reflex neuroses arising from worms, from teething, and so on, would be quite as justifiable as the one before us. In all, the result would most

probably be almost identical, the symptoms being modified only by the age, sex, and other conditions under which the patient might be placed. The physiology and pathology would in all be the same.

Dr. Engelmann states that he does not consider that the affections he describes and his views of their origin have received much attention in works on the subject. It must, however, be remarked that the symptoms themselves have been known and described from the earliest ages under the name of Hysteria, and precisely the same explanation given of their origin. Until recently, and even by some at the present day, the disease vaguely denominated hysteria was believed to originate in irritation of the uterus, and hence the name. Most pathologists, however, do not now hold so exclusive a doctrine, and recognise an independent origin of this malady. Whatever the real nature of this may be, all have long been acquainted with its symptoms, and the author, therefore, confirms the experience of ages as to facts, and explains them as Actius and his followers did centuries ago. In short, he gives the new name of hystero-neuroses to a series of phenomena which have been long recognised under the term hysteria.

Dr. Engelmann draws a distinction between these hystero-neuroses and hysteria as generally understood, pointing out that the patients who suffer from the symptoms described are not of necessity nervous or impressionable, and that the convulsions, &c., are purely reflex in character. He would therefore lead us to infer that the persons thus affected were otherwise healthy until the neuroses were developed by the uterine irritation. We, however, venture to question also this hypothesis. We believe that the uterine irritation is only the exciting cause of the motor and sensory reflex acts, and that a prior predisposition to nervous disease existed. All children during dentition do not have convulsions, spasms, &c., only a certain minority being thus attacked, and these probably have an irritable and susceptible nervous system, either inherited or acquired, which renders them not only more sensitive to slight irritations, but causes an exaggerated development of reflex results. Hence the eruption of a tooth in them produces convulsions, while in the healthy

child it is attended with little or no inconvenience. That such a nervous predisposition exists apart from the teething is further indicated by the fact that those children who are thus upset during dentition are in after life frequently attacked with chorea, epilepsy, hysteria, and other nervous diseases, showing that from the first they were the subjects of a nervous diathesis. Again, if teething alone caused convulsions it would be general, while we know it is comparatively the exception.

Precisely in the same way all and perhaps the majority of women with uterine affections do not suffer from spasms, hysteria, and other hystero-neuroses; on the contrary, it is notorious that gynæcologists tell us that subjects suffering from cancer and other grave affections of the womb are not by any means especially liable to nervous disorders. On the other hand, given a nervous instability, a morbid susceptibility to explosions of movement and pain, an irritation of the uterus, however slight, may be the spark which kindles up general nervous demonstrations. We see this frequently in those cases of greatly impaired health, and where there are the most severe nervous attacks, which are associated with the mildest forms of uterine disorder, with menstrual irregularities, and so on. If the general nervous system of a woman be healthy, we greatly doubt whether any disorder of the uterus would induce any of the more serious reflex symptoms described under the term hystero-neurosis; but given a delicate and highly nervous and impressionable patient, the slightest disturbance of the uterus or of any other organ might induce the severest form of reflex nervous disorder. If this be so, we are practically dealing with what has hitherto been named Hysteria, by which term has been understood a variety of neuroses occurring in certain peculiar constitutions, of the nature and origin of which at the present time we know very little. The expression of the author, hystero-neuroses, are simply those symptoms which arise in that disease from irritation of the uterus as an existing cause, in distinction to irritation from any other part of the body. We might therefore with equal reason speak of dental, cutaneous, or cerebral neuroses, according to the organ which originated the irritation.

It is often stated that if reflex phenomena are not so common with structural disease of the uterus, that they are specially liable to arise from functional disorder of that organ. The question then arises, Are these affections of the womb the veritable cause of the nervous disorders, or are they not the results? It is very generally assumed when hysteria and other nervous phenomena are associated with those uterine affections that the latter are the direct or indirect cause of the former. There is no evidence of this, on the contrary it appears to us that in the majority of cases the state of the nervous system is the cause and not the result of their functional disturbances. We believe that the amenorrhœa, for example, in delicate, impressionable young women is one of the symptoms of a general nervous disposition; and when we inquire into the past history of the patient, we often find that she has suffered from all the nervous symptoms before puberty, that she has probably inherited a neurotic tendency, and possibly had dental convulsions, chorea, or other such affections in her youth. On growing older the symptoms are modified by a variety of circumstances, and new ones are developed, among others, disordered menstruation. In such a case as this, which is so common, it would be as erroneous pathology to say that the amenorrhœa was the cause of any nervous symptoms which might subsequently arise, as it would be dangerous treatment to centre the attention on the uterine irregularities when the general health was so obviously at fault. We do not of course mean to deny, if tangible and removable disease of the womb exists, which can be shown to be the exciting cause of reflex action, that it should not be treated; but we suspect that such cases are not common, and that the functional uterine disorder is by far more often the effect than the cause of nervous disease.

A. Hughes Bennett, M.D.

On Regressive Paralysis (Infantile Paralysis, Spinal Paralysis of Adults). By WILLIAM H. BARLOW, M.D., Consulting Physician to the Dispensary for Sick Children, Manchester. Manchester, 1878.

THE author of this reprint fears that as his work so soon follows the publication of Dr. Althaus's Essay on the same subject, he may be assumed to have borrowed some of his conclusions from the earlier published work.

But a very cursory glance at the paper will show that the clinical part of it represents a considerable amount of patient and conscientious work, and the analysis of sixty-three cases given quite irrespective of the results of treatment obtained, imparts a solid value to it. Concerning the style of the reports, we will only say that we trust in a future edition the author will give us more detail, if possible, on the progress of his cases, and the frequency with which his therapeutic measures were used, and will also eliminate the prolix account of the family history, which in the disease described appears to be useless.

Under the title "Regressive Paralysis," the author proposes to include cases hitherto known as essential paralysis of children and allied cases occurring in adults. There is something to be said for a revision of terms. Since the morbid anatomy of the infantile cases has been studied microscopically, disease of one or other of the anterior horns of the grey matter of the spinal cord has been always found.

Whether this lesion be primary or secondary, its discovery ought to exclude from our nosology the term "essential" as applied to such cases, because of its giving an erroneous view of the nature of the disease. The term "infantile paralysis" is unsatisfactory, because, first, paralysis occurring in infancy is not limited to this type; second, because although the most frequent period for the onset of this disease is during the first dentition, yet cases are met with in children beyond this period—for example, I have seen the disease beginning in a child aged 7½ years. But the strongest objection to the term is that a number of cases have been recorded of disease in adults having a nearly identical clinical behaviour.

Until some more acute fatal cases have been examined, it is doubtful whether we are justified in giving the disease a strictly anatomical name.

Although, as Charcot contends, the stress of the disease probably tells on the motor cells of one or other anterior horn, and it may be that the other changes found in the cord are secondary, yet there are clinical reasons suggesting that in some cases at the onset there is a much more extensive disturbance of grey matter, perhaps even cerebral as well as spinal. Moreover, can any more conspicuous example be given of the failure of the anatomical characters when taken alone as the basis of nosology than the similarity of lesion found in two such different diseases as infantile paralysis and progressive muscular atrophy? Vulpian's suggestion to get over the difficulty by the assumption that one is an acute, the other a chronic form of the same disease, is surely special pleading.

As stated by the author, in typical infantile paralysis, considered clinically, the morbid action is definitive in its distribution in the sense of not extending beyond a certain area attained very soon in the course of any given case. Of the diseased structures included within that area, certain of them may get worse, but others tend to return to the normal condition.

It is on the ground of the second-mentioned characteristic that the author bases his title, *regressive* paralysis.

With respect to the "definitive" area of the disease, it is, however, only fair to remember that there have been some cases where, according to Charcot, "the paralysis in place of attaining at one stroke its highest degree of intensity, has become developed in a progressive manner in the space of a few days, or even a few weeks, and a few others, in which during the period of regression there have been aggressive relapses." I have seen one such case. But these exceptions do not invalidate the general distinction from progressive muscular atrophy where the paralysis follows the atrophy instead of preceding it, and the disease extends from one muscle to another.

The author gives a careful *résumé* of the microscopic researches made especially by the French physicians on this

disease, but as he contributes no new facts, it seems best to consider specially his own observations on the clinical features of regressive paralysis.

This is the first paper, so far as I know, in which attention is drawn to the frequency of onset of this disease in the two hottest months of the year. "Of fifty-three cases in which the date of the attack could be fixed with accuracy, twenty-seven occurred in the months of July and August."

In out-patient practice, the long interval which has generally taken place between the first occurrence of the paralysis and the time when a child is brought under observation, renders it difficult to obtain reliable information as to immediate antecedents; but, judging from the facts elicited by the author, it would appear desirable in future to enquire more closely into the possibility of heat stroke as well as of local cold exposure.

It is very significant that out of sixty-three cases, after careful analysis, the author is only able to associate five with troubles of dentition. It may be safely asserted that of all the "*dei ex machinâ*" which have hindered the study of children's diseases, and which have alike condoned the indolence of the doctor and the carelessness of the parent, none has been more harmful than the indiscriminate reference of infantile diseases to the result of teething.

Without denying the manifold disturbances, nervous and otherwise, associated with the eruption of teeth, we are justified in requiring some careful accounts of the nature of the local irritation in cases where the teeth are held responsible for inducing organic disease in other parts of the body.

The careful investigation made of late years on so-called reflex paraplegias appears to show that they are mostly resolvable either into hysterical conditions or ascending neuritis; and these results would suggest a more rigorous enquiry into all cases of organic nervous disease assumed to be due to reflex action.

With respect to the invasion of the disease, the author very justly lays great stress on the febrile stage which probably exists at the onset for some days, although frequently ignored. It is exactly this period which deserves most study. It is disappointing to find no account of the pyrexia. The only

fact I have to offer on this point is that in one case, three weeks after the onset, the rectal temperature was 104·4. The author records eleven cases in which convulsions preceded the attack, and in several the convulsions were repeated, which would seem to imply that their significance was more than that of an initial rigor. In several of the cases, also, there is a history of the patient lying unconscious for awhile.

As to the important question of the participation of the brain in the disease, about which Volkmann has no doubt at all, there are a few valuable notes, though one could have wished for more details.

In six cases the author records the existence of facial paralysis for a short period. This is very important; and it is to be noted that amongst English observers Dr. West (p. 240) also states that he has seen temporary facial paralysis, with true infantile paralysis. Now although it may be urged that without post-mortem examination it is impossible to assert that these cases belonged to the infantile paralysis type, yet there is a strong argument in favour of the author's view in the fact that in five of them ultimately certain limb-muscles were "picked out" more or less atrophied.

It is quite true that many cerebral lesions occurring in infants are followed by arrested growth of the opposite side of the body; but I am not aware that in such cases individual muscles are "picked out."

Moreover, the great majority of such cerebral cases are characterised by the existence of some spastic condition or inco-ordination of movements, neither of which appears to have been present in the examples recorded.

About Case 11, where right ptosis, right facial paralysis, and complete right hemiplegia occurred, but where ultimately there was response of all the muscles to faradism, I doubt very much whether the author's view can be sustained.

Cases 5 and 29 also seem inconclusive.

In Case 12 there was loss of speech for some weeks. Unless there were other evidences of bulbar disease, an altered vascular condition of the cortex would appear more probable than the author's suggestion of damage to the hypoglossal nucleus, but whatever the cause, it is of interest as bearing on

the cerebral extension of the disease. The author has an important observation on the not unfrequent cases of crossed-limb paralysis. He found one case in which at the onset all four limbs were affected, but eventually regression took place from the two upper and one lower extremity, leaving only the left leg to definitive paralysis and atrophy. Generally he believes "that the crossed form is the result of regression from one or more limbs in cases where three or all four have been affected."

The occasional observation of pain and hyperæsthesia, to which the author refers, is of importance as connecting the infantile with the adult cases where these conditions are notable features at the onset.

The outcome of the author's cases, and his analysis of them, is certainly in favour of the greater generalization of the disease at first than has been often supposed.

Even in the later stages there are not wanting evidences of greater extent of damage than at first might be supposed.

Thus Volkmann specially dwells on the general arrest of development of the whole limb, sometimes even of the whole of one side of the body, in cases where only one or two muscles of the leg are picked out as atrophied.

I have been struck very often in testing electrically, children who were the subjects of infantile paralysis of some standing, with the distinctly subnormal response to both faradism and constant current in limbs other than those where atrophy was noticeable to the naked eye.

With respect to treatment, the author seems to have had excellent results in a few cases. Some of his recoveries have been in cases that were galvanized, &c., for twelve months.

Some more details as to frequency with which galvanism and faradism were applied in the successful cases, and the sort of home treatment used would have been valuable. But the moral of these cases is to "persevere," and this is much more satisfactory than the pessimism and nihilism of those who base their disparagement of galvanism on the results of intermittent treatment for limited periods.

It seems hard to understand how any man can wholly disparage galvanism after but a single observation of the redness

and warmth brought back to a cold wasted limb, even when there be but scant response of the majority of the limb muscles.

The great value of galvanism, as Dr. Poore has pointed out in these cases is, that it is the best external stimulus we have to the nutrition of the atrophied member.

Moreover the power of compensation of both muscular and nerve structures is so great, that even if only a vestige of response be obtained at first, it is fair to hope for some benefit from long-repeated trial, and that "responding" structures may in some degree take on the function of parts which are atrophied.

Friction by the parent at home and attention to warmth are doubtless quite as important as galvanism by the doctor, but most important of all appears to me the lesson taught us by the Swedish gymnasts, viz. of inducing as early as possible nervous influx from the child's own cerebro-spinal centres into the partially paralysed limb.

Where it is impossible to get a child to stand, it has appeared to me that the best results follow from the nurse's frequently performing such movements of the partially paralysed limb as evoke some antagonism, however feeble, in those muscles of the limb which remain unparalysed.

THOMAS BARLOW.

Habit and Intelligence. By J. J. MURPHY. Second Edition. Macmillan and Co. London, 1879.

THE object of the book is "to show the necessity for recognising in all life, both organic and mental, an intelligent agency which cannot be explained as a resultant from unintelligent forces."

This it seeks to accomplish by an examination of the results of recent biological investigation, and thus attempting to ascertain what are the chief laws which these facts exemplify, so as to determine whether or not these laws are derivable from the more general laws which obtain in inorganic nature.

The work is described as "a series of essays on the laws of

Life and Mind," but it has not the fragmentary character that might have been expected; all the parts being mutually dependent, so as to form a definite whole, with a distinct purpose.

It is written in a popular manner, and is to be reckoned among a great number of publications, similar in style and aim, that have appeared since the recent floods of light which have been shed upon these subjects; but this one is above the average, the material being not only of wider range, but better digested than is often the case; moreover, the author neither blindly adheres to, nor furiously opposes, any party doctrines.

The greater part of the work is descriptive, being an exposition of the writings of Darwin, Wallace, Carpenter, and others; but selection is judiciously made from the abundant material existing, comprising Physics, General Biology, Psychology, Sociology and Morals, and even Metaphysics; the light, therefore, of the book is mostly transmitted, but condensed and brought to a focus; and at the same time, though making allowance for the extreme suggestiveness of the source of information, the light receives addition during transmission, the novelty being chiefly in the aspects given to the subjects under discussion; though perhaps there is not much that is absolutely fresh in the way of criticism. Those familiar with the leading works on these subjects may still perhaps be interested; and by those who have not time or inclination for perusal of these works, this will be found an excellent compendium.

Of the first edition, most of the sections on physical science, more commonly known facts and laws, evolution, &c., as well as the more formal parts of science, have been replaced by chapters on some of the more special facts of Biology, and the Psychology has been re-written.

In order to give a somewhat adequate idea of the nature and scope of the work, we will give an outline, with a few extracts, to show its leading features.

In the Introduction, the author states his position, and lays down definitions; he says that "Vital (i.e. belonging to unconscious and conscious life) principles consist of two

classes—(*a*) belong to the border land where life comes into contact with inorganic matter and force, such as nutrition and reproduction; (*b*) distinguished from the preceding, are most important and belong to the inner domain of life itself—the laws of organisation and of mind.". "In this inner domain of life, on which dynamics and chemistry have scarcely any light to throw, we find two principles, which are, as I believe, coextensive with life, and peculiar to it; these are, Habit and Intelligence." "*Habit* is used in an unusually wide sense: that law in virtue of which all the actions and characters of living beings tend to repeat and perpetuate themselves, not only in the individual but in the offspring. This is a fundamental law of life and mind."

"*Intelligence.*—It is found in none but living beings;" "it is an attribute of all living beings, and coextensive with life." But it includes "not only the conscious intelligence of the mind, but also the organising intelligence which adapts the eye for seeing, the ear for hearing, and every other part of the organism for its work. The usual belief is, that the organising intelligence and the mental intelligence are two distinct intelligences. I maintain, on the contrary, that they are not distinct, but are two separate manifestations of the same intelligence, which is coextensive with life, though it is for the most part unconscious, and only becomes fully conscious of itself in the brain of man." "Habit, in itself, is obviously an unintelligent principle." "But . . . the question arises whether intelligence is an ultimate fact, incapable of being resolved into any other, or only a resultant from the laws of habit. This is by far the most important of all questions now under scientific discussion, and perhaps the most important that Science can ever have to consider." "This question divides itself into two: the one concerning the unconscious intelligence that organises the body; the other, concerning the conscious intelligence of mind." Concerning the origin of species, the author says, "I agree with Mr. Darwin that all species have been derived by descent with modification, probably from one, certainly from a few original germs; and further in attaching great importance to natural selection among spontaneous variation, as part of the agency by which

the modifications have been effected. But I altogether differ from him in that I believe the wondrous facts of organic adaptation cannot have been produced by natural selection, or by any unintelligent agency whatever."

About *Mental Intelligence*, Mr. Murphy says he has "come to a conclusion fundamentally opposed to that of the dominant psychological school in this country, founded by Hartley, and to which Mill, Bain and Spencer belong; . . . the characteristic point of whose theory is to account for the whole mental nature by the single principle of association, or, as I call it, *Mental Habit*. I maintain, on the contrary, that in all mental intelligence, as in all organising intelligence, there is an element not derived from habit, and not resolvable into any unintelligent agency whatever."

Finally, he endeavours "to show how the science of history is capable of being elucidated by the same principles which have thrown so much light on the development of individual organisms, and of organic species."

In several places "we are brought to a region usually regarded as out of the domain of science;" "such subjects as the origin of the universe and of life, the nature of intelligence, and the nature and ground of the moral sense, suggest questions, which, if they are to be answered at all, must be answered from data which are not to be found in the visible world." "On account of their transcendent importance, they are treated of separately in the author's 'Scientific Bases of Faith.'"

The first few chapters deal with the elementary facts of life. Organic chemistry is declared to be absolutely distinct from inorganic; "for it is improbable that albuminoids can ever be formed except by living beings." Here, it seems to us, that the author credits the science with a maturity to which it is not entitled; for it is growing rapidly in a truly positive method, by repeated analysis—just as the fertilised germ divides and becomes a "mulberry mass"; but this stage is as yet far from being reached in organic chemistry, and it is impossible as yet to say to what extent integration may not be carried when form at length shall have appeared in it. Life is said to *guide* physics and chemistry, through which it works.

In Chap. III. there is an outline of general physiology, mostly derived from Carpenter's work. The nutritive system is said to transform matter, energy becoming potential (vital energy); and this again is made kinetic—as heat and motion—by the nervo-muscular system. In a note, alcohol is supposed to act by altering the proportion of heat to motion thus produced; the sum-total remaining the same, more motion is produced at the expense of the heat. Life is thus defined: "An organism consists of a mass of peculiar chemical compounds of high complexity, and contains a peculiar kind of energy. Life consists in the constant transformation by the organism of matter and energy into these peculiar forms, and the equally constant transformation and parting with matter and energy." This definition is unsatisfactory, for it is merely an incomplete description of the vital processes: it omits the essential attribute, viz. persistent identity of the whole, while pervaded by constant change of its parts. He does not discuss other theories of life, nor does he anywhere incline to controversy for controversy's sake. In a note he mentions and rejects Radcliffe's theory of muscular action.

Chap. III. deals with the Origin of Life. The author thinks experiments point against spontaneous generation. He applies the term "vital principle" to the agency that produces organisation, and causes the vital functions to go on, for we are entirely ignorant of its nature. Probably life originated by a definite creative act—a view which is strengthened by the fact of the definite commencement of the present state of things (quoting Clerk Maxwell); but a succession of creative acts is not impossible.

In Chap. IV. life is said to be the cause, not the effect of organisation; and although the possibility of much ultra-microscopic structure is admitted, yet this is considered impossible to account for peculiarities of germinal matter: and the hereditary transmission of functional peculiarities is declared to be incapable of explanation by such hypothesis. We confess that this does not seem so self-evident to us. The hypothesis of Pangenesis is not referred to here. There are said to be three chief relations in physical science—Causation, Resemblance, Purpose: causation predominating in the typical

physical sciences, resemblance in the classificatory, and purpose (the relation of special structure to special function) in biology, where causation is least seen. Organisation is defined as the adaptation of structure to function; and the relation of structure to function is said to be the same as the relation of means to purpose.

In Chap. IV. development is described as the transformation of germinal into formed matter; repair is an example of development. Differentiation and integration are said to be the direction of development. Besides these, the organism presents relations of *dependence* and *subordination;* the former being an extension of Comte's series of the sciences within the domain of biology—animal life depending on vegetable or nutritive life, mental life on animal life. But subordination is seen only in the organic world, life working through physical and chemical properties; conscious functions through unconscious ones.

In Chap. VIII. a table of the organic functions is given, thus—

Unconscious	Nutritive or Vegetative.	Chemical	Forming organs.
		Structural	„ tissues.
	Motor or Animal.	Spontaneous.	
		Reflex (stimulus unfelt).	
		Consensual (stimulus felt).	
		Voluntary.	
Conscious	Sensory.		
	Mental.		

Chap. IX. *On Habit and Variation.*—It is said to be an example of Habit that acts tend to become easier on repetition. All and none but vital actions become habitual. All mental and motor acts are habitual, except those that are directed to conscious purpose by voluntary impulse. Habits are changeable. *Laws of Variation.*—Some variations are spontaneous: the possession of one habit facilitates the acquisition of a similar one; habit gains prominence by recent use, tenacity by prolonged duration; thus, after disappearing in one generation, it may crop up in another—reversion. Active habits strengthen, passive (i.e. stimulation not followed by any response on the part of the organism) weaken by repetition. The laws of Habit do not account for every particular habit, for they throw no light on the first of a series of habitual

acts. Slight external changes are beneficial, great ones injurious; therefore great variations can only be brought about gradually. Adaptation is admitted but unexplained.

Chap. X.—Though believing in Evolution, Mr. Murphy considers a guiding intelligence essential.

Chap. XI.—*The Facts of Variation*—is mainly a summary of Darwin's 'Variation of Animals and Plants.'

In Chap. XII. the sufficiency of natural selection is considered, and found wanting. Tait's argument of the small chance a single case of favourable variation would have is quoted; also the less endurance and prolificness of high organisms tells against their race.

Chap. XIII. contains some interesting statements:—that allied species frequently present parallel (i.e. having a close correspondence) varieties; and the same is sometimes seen with regard to genera and species; and thus several species of the same genus may be derived from different genera. This is corroborated by the specific characters sometimes appearing before the generic in an individual. Sometimes a series of species in one genus correspond thus with a series in another. This argument has been brought forward by Prof. Cope against natural selection, and in favour of innate tendencies of development: and Mr. Murphy seems disposed to concur; but surely, among all kinds of spontaneous variations, a similar one would appear in more than one kind of organism, and if favourable would tend to be preserved by natural selection; and the facts of analogous organs would rather support such an application of natural selection.

In Chap. XIV. it is argued against natural selection that the least important characters often become most readily fixed; and certainly such examples show that natural selection is by no means the only means of fixing an alteration. Delbœuf's mathematical law is quoted—that if a few individuals marked by a harmless peculiarity are produced in each generation, their proportion will tend to increase till their number equals that of the representatives of the original stock.

Chap. XV. is on the effect of Change of Conditions. It produces a tendency to general variability; very often a certain change of habitat, temperature, &c., will produce a

definite change in the form of the organism; well seen in Fungi.

Chap. XVI. contains an account of Mimicry, Colour and Sexual Selection, being largely derived from Wallace's essay ('Macmillan's Magazine,' Sept. and Oct. 1877). Natural selection fails to account for protective mimicry, because of the uselessness of early imperfect imitations; but Mr. Murphy considers the similarity of two kinds of organism is due to the similar effects of locality on each, and that thus the protection is secondary. But we think this would not account for the similarity (e.g.) of insects to leaves or sticks. Mr. Murphy says that it seems undecided whether seasonal alterations are due to protection or to impaired nutrition in winter. The power of imitating is probably primary in animals—e.g. chrysalides match the colour of the box containing them. Colours of plants are probably to attract insects. Sexual Selection is next considered, but regarded as doubtful, for ornamental characters are too constant. Probably (as in beautifully-coloured sea-shells) nature sometimes acts purely for ornament.

Chap. XVII. is devoted to an examination of the evidence afforded by Metamorphosis and Metagenesis. Metamorphosis is defined as "development with change of plan." Examples are given, showing how the occurrence of the changes may be influenced by external conditions, and how they may sometimes be completely lost, there being always a tendency to skip those stages; and the Batrachia are good examples where this tendency may be successful or the reverse. In the Batrachia, they probably seem to be due to adaptation; but this can scarcely have been the case in the higher Crustacea. Most are progressive, though some are retrograde. The Nauplius is the tadpole of Crustacea. Metamorphoses afford evidence in favour of evolution, but against natural selection. In considering the metamorphoses of insects, Sir J. Lubbock's views are given: the change of mouth-type in many is acknowledged to be hard to explain. The maggot form of larva is suggested to be the copy of an ancestral worm. A suggestion is made that the Myriapoda may have been descended from Vermes, and have come to resemble insects by parallel variation.

The metamorphoses of Echinodermata are pronounced inexplicable by natural selection, for they do not seem to be adaptive. The process of Metagenesis is likened to what would be the case if flowers were to be detached before maturing their seed. The Medusa-structure is considered to be non-adaptive, and therefore to be inexplicable by natural selection, for the form would be useless until the Medusa became quite detached.

Chap. XVIII.—*On Structure in Anticipation of Function*—is of importance to the main argument of the book. Self-adaptation and natural selection, being incapable of foresight, are declared incompetent to account for all cases of development—e.g. cannot fit organism for future conditions: thus the gradual tendency in the race of Hydrozoa to establish detachment of free Medusæ is considered to prove foresight in order to procure this character when it should be needed. But the argument is allowed to be inconclusive. Similarly the vertebral structure of the Ascidian larva is considered to be the foreshadowing and foundation of a structure whose use is only foreseen. But this argument seems to us quite inconclusive, because the Ascidians have probably retrograded, and the vertebral structure might have been useful to its earliest possessors. The swim-bladder of the fish is adduced as evidence of preparation for the future wants of the race; but it seems to us that there is no evidence of its becoming complex (e.g. in Ceratodus and Lepidosiren, which are presented as instances of the contrary) except when exposed to conditions when such would be useful. Mr. Murphy next shows that a leg could not have been developed from a fin by natural selection, for the intermediate forms would be useless; but is it not more probable that fin and leg have diverged from a common simple, type of limb? Thus we do not feel convinced by Mr. Murphy's cases; but we admit, that if he could demonstrate a case of what he seeks to show, it would be of extreme importance to his theory.

Chap. XIX. will interest most readers: it treats of the Origin of man. He is believed to have been produced by evolution: but Mr. Murphy says that his brain is perhaps the only conclusive evidence of the inadequacy of natural selection

to account for modifications. Thus Mr. Wallace holds that primitive man has a large surplusage of brain: Mr. Murphy's position is somewhat different, for he thinks that the large size of the brain is due to the acquisition of language at that early period, but that then the language was in advance of the intellectual necessities of its possessors; and therefore could not have been evolved by natural selection; also confirmed by the very slight difference in size between the brain of the savage and that of the intellectually developed civilised man; and by the assertion of moralists that in uneducated men especially there is a large amount of undeveloped brain-power. But is the possession of language really the essential characteristic of man? and, if so, is it beyond his needs in the primitive state? We ourselves do not consider language to occupy such an important position, but to be rather a *proprium* or *accident* of man—just like the facts that he is a cooking or tool-using animal, or a forked radish, or unfeathered biped; and that the most essential quality is the power of reflection—man thereby attaining a clear notion of his personal identity; and that this would be the chief cause of his subsequent immense intellectual and moral progress. But until anything like a science of Comparative Psychology—or even a complete acquaintance with human Psychology—exists, it will be impossible to light upon the differentia of man, or even to determine whether or not his powers and needs are duly proportioned. At any rate there is very strong *à priori* evidence against superfluous powers. Man's hairless back is also considered, as pointed out by Mr. Wallace, inexplicable by natural relation.

Chap. XX.—In this chapter, geological time is said to be too short for the known series of changes to have been produced by natural selection only, therefore it must have been supplemented by other agencies;—similar examples are also adduced of the apparently rapid evolution of a species. It is also declared that the wing of the bat, &c., could not be evolved through natural selection or self-adaptation: but we cannot feel convinced by such examples; for it seems to us probable that the membranous expansion might have been produced by continual stretching of the integument (natural

selection also operating) just as the mouth-structures of the snake have become distensible: and it is not necessary that actual flight should have been performed at first.

Chap. XXI.—Some minor objections to Darwin's theory are brought forward: and then the tendency to similarity of homologous parts and similar tissues is advanced as sufficient to account for many modifications of growth; thus the necessity of an organising intelligence is shown, though this need not act constantly and uniformly.

Chap. XXII. *Intelligence.*—Formative, motor, and mental functions are all guided by intelligence, though this need not be conscious. There is gradation between unconscious and conscious action.

Chap. XXIII. *Instinct.*—Special instincts are as difficult to account for as are special organs. The movements of Spermatozoa are similar to food-seeking Instinct. Mr. Murphy considers it impossible that this or the complex instincts of the frog can have been formed by gradual adaptation and inheritance; therefore a self-guiding intelligence is proved. The possibility will probably not appear so inconceivable to all evolutionists.

We come now to the phenomena of Mind.

Chaps. XXIV.–XXVI. deal with elementary facts:—Mind starts from sensation, but sensation alone does not constitute mind. Formation and association of ideas is due to habit, for memory (i.e. permanence) is implied.

Chap. XXVII.—*Time, Space, and Causation regarded as forms of Thought*—begins with an imaginary future criticism on modern metaphysics. Our notion of Time is obtained along with that of permanence of self. The idea of Space is also primitive—obtained with the idea of an external world opposed to self. Mr. Murphy considers that muscular motion is requisite to give us the idea of the third dimension of space; but we think that this might be obtained from sight alone—though this would of course be less complete. Causation is said to be derived from the Mind's knowledge of its own activity; external observation showing merely "unconditional antecedence," and nothing in substance but permanence. But "action implies an agent." "Substance really means an

agent." Here we must express our dissent from Mr. Murphy: for we think external observation gives us the idea of force or efficiency—which is just the property that he considers —and rightly— the essence of Causality—as well as unconditional sequence; and this efficiency we attribute to the agent—Substance. This is well put forth by G. H. Lewes ('Problems of Life and Mind,' vol. ii.). Therefore it is unnecessary to seek an explanation in pure subjectivity.

Chap. XXVIII. *The Grounds of the Moral Nature.*—Its root is in the sense of pleasure and pain: these serve to guide the intelligence of a sentient organism. Morality consists in three things—prudence, unselfishness, holiness (preference of high aims to low). As in all life, the higher is developed out of, and presupposes, the lower. The author disagrees with Mill's explanation of higher qualities by association.

Chap. XXIX.—Sensation is the germ of mind. Language is essential to thought. Prudence is due to association. Sympathetic feelings are founded on our own pleasures and pains.

Chap. XXX.—A child learns to use the pronoun "I" without habit or imitation.

Chap. XXXI. *Physiology of Mind.*—There is mental nature only in Vertebrata and the higher Arthropoda, where the nervous system is centralised; and no sensation in the simplest and lowest nervous system. Adopts Carpenter's view of the functions of the parts of the brain. He quotes Prof. Young, of Dartmouth Coll., U.S., that objects illuminated by an electric spark may be seen a second, third, or fourth, time, which he attributes to return of the nervous current to the retina, and reflexion again to the sensorium. Attention is ascribed to concentration of the nervous current in the sensory ganglia, the normal consensual motor impulse being inhibited by a downward discharge from the cortex. In a note, Ferrier's experiments are mentioned, and the movements produced are considered to be due to stimulation of the corpus striatum.

Chap. XXXII. *Automatism.*—An Automaton is defined as "something which can act only as it is acted on." Primary automatism is due to vital intelligence: secondary automatism

is unconscious habit, resulting from education. We do not agree with Mr. Murphy in thinking that the impulse to self-preservation is other than the avoidance of pain. Is consciousness a link in the chain of causation? To ascertain this, Mr. Murphy proposes the further question—How is healthy action accompanied by pleasure; and how do hope and fear affect actions? saying that, "if Automatism were true, health might be painful," &c. Perhaps it might, but such conditions do not exist, except as an occasional exception. We only know that, as an ultimate fact, benefits are pleasant, and pleasures prompt us to obtain them: we cannot explain them further, so Mr. Murphy's argument has not very much weight.

He next says, "The Will does not create, but directs energy. . . . If the theory of Automatism is true, the Will is only the general resultant of all the mental forces. . . . It sounds like a merely identical proposition to say that in every conflict of motives the strongest impulse is that which prevails. Yet every one who has performed any act of true self-control or self-denial, knows that such is not a substantially true account of the case, that it is possible for Will, directed by Conscience or a sense of Duty, to prevail over mere impulse." Now, with regard to the first statement that "will directs energy," we confess that we do not see how this is possible: for, though it is stated in a note (quoted from 'N. Brit. Rev.,' 1868) that "a force acting at right angles to the direction in which a body is moving does no work, although it may continually and continuously alter the direction in which the body moves," it is not at all clear to us how such could take place without creation of force or disregard to the second law of motion. However, the truth will be plainer to our physically educated readers. A quotation is also made from the 'Contemp. Rev.,' June 1878, where it is attempted "to show that a motor may at certain points (points of bifurcation) indifferently take one or other of two different directions—so that an extra physical action might be the effect of a directing power." However, this is not generally accepted among mathematicians, and we are not mathematical enough to be convinced by it. With regard to the second part of our author's statement, we think that the

highest motive preponderates because it is most skilfully directed by reason—which outweighs mere brute force of impulse.

Chap. XXXIII. *Habit and Variation in History.*—The Sciences of language, æsthetics and politics, all depend on psychology. In language, habit and intelligence both work—habit supplying the words, and intelligence combining them. Mr. Murphy hopes that in time the science of comparative grammar will be extended to comprise comparative syntax as well as comparative etymology. Language is an organism—constructed by thought to serve as its instrument, as life constructs and uses the body. Like bodily organisms, language presents growth, development, rudimentary organs, variability, morphology. In fine art, the moving power of progress is the love of slight novelty. The same holds in politics; all changes must be gradual; progress consists mainly in the formation of habits. Custom is older than legislation, i.e. unconscious before conscious.

In Chap. XXXIV. the operation of natural selection in history is exemplified. Mr. Murphy criticises Mr. McLennan's view of primitive marriages; though agreeing with him that marriage arose from wife-stealing, he differs in holding that, instead of this being prompted by female infanticide, it was rather due to the desire for domestic life, and the favourable effects of natural selection.

In Chap. XXXV. the individual and social organism are compared.

Having now sketched the contents of the work, we will just glance at its leading features apart from the detail in which they are founded.

His first and main point is to establish the existence of an intelligent principle, i.e. skilful direction towards a purpose, as opposed to blindly acting force.

After this (its existence being proved) comes the inquiry as to its nature. Mr. Murphy considers, and endeavours to show, that it is something distinct from ordinary matter—that matter *per se* is not invested with properties that might under some peculiarly favourable combinations present the pheno-

mena we know as life. This he proves by an investigation of natural selection and other inorganic agencies, and finding them insufficient to produce the effects that might be attributed to them: and thus, this purposiveness is something superimposed on ordinary matter—which does not, according to him, show "the promise and potency of every form and quality of life" (Tyndall). But his position here is not altogether clear, for it is not obvious whether or not he would ascribe all changes in the inorganic world to the inherent properties of inorganic matter, or whether the most complex, at least, of such processes depend instead on the guidance of those energies by a superior skill.

We have before stated that we think his argument of the power of an immaterial principle to act on matter is inconclusive.

It is not altogether easy to ascertain what meaning he would attach to *Habit*. Whether it is due to the properties of matter, as a resultant from some peculiar conformation, or whether it is an immaterial principle, similar in kind, but inferior in degree of skill to intelligence; probably the former is meant, for it is not denied to be derivable from an unintelligent agency. But he ascribes to habit the tendency to become easier on repetition; and this to us seems to be rather the *effect* of habit, and to imply intelligence; and thus his distinction between habit and intelligence does not seem to us to be absolute, but that both are examples of intelligence; in the one case acting as adaptation, in the other as reproduction. Certainly, he says that intelligence is exercised in every formative and motor act; and perhaps he means that in every habitual act, it is intelligence acting *through* habit, as life works through physics and chemistry.

That natural selection fails to give a complete explanation of organic variation, or even to be the chief agent, we think he amply proves; in this, his arguments much resemble those of others, especially Mivart; in fact, his main weapon—structure in anticipation of function—is almost identical with Mr. Mivart's, of the uselessness of incipient structures; but, as we have before said, we do not think the arguments unanswerable, for it is impossible to say what may or may not

have been the use of an organ in that stage, nor even what that stage was like, for its early and subsequent uses may be widely different. Mr. Darwin's supposition concerning the baleen of the whale is a case in point. Mr. Murphy seems to argue as if we ought at once to be able to predicate the use of every particular structure; but surely this is assuming for ourselves a power of penetration to which we have no claim; for though analogy justifies us in assuming that every part probably is of some use—great or small—to the organism, yet it may be long before we learn what that function is. But Mr. Murphy acknowledges the frailty of the evidence in support of such preconceived and designed adaptations, except as applied to the brain of man, a case which we consider perhaps less proved than the rest. To us it seems far simpler (a justification Mr. Murphy perhaps would not allow, although we merely use it hypothetically) to assign such harmony of function to need to a power of adaptation, inherent in the organism by virtue of its constitution, and of whose life it is the ultimate law, special adaptations and habits being but examples of it: Mr. Murphy looks on it in the opposite way, considering habit and intelligence ultimate, and adaptation but special cases of these. With respect to the question whether an organism has an innate tendency to develop, Mr. Murphy evidently answers in the affirmative, though he ascribes it to intelligence, working by means of the simple qualities of the organism; and in this respect he appears to differ somewhat from Mr. Mivart, who lays great stress on this innate tendency as the chief agency of progress, comparing (after Mr. Galton) it to a multi-facetted spheroid constantly seeking a more stable equilibrium; while Mr. Murphy dwells as strongly on the intelligent adaptation to outward circumstances, though recognising the inherent tendency to progress; thus also he differs from Mr. Spencer, who denies any inherent tendency to progress. In this, we are disposed nearly to coincide with Mr. Murphy, for we think that a constant tendency to a more stable internal equilibrium is as strong as the constant tendency to equilibrate internal with external conditions.

Concerning the nature of the intelligent principle, Mr.

Murphy entirely discards the belief that the skilful direction of the organism is resolvable into the properties of its constituent parts; and he does not seem to think that physics and chemistry will reveal to us properties of matter more subtle than we at present know it to have. In this we think he is premature; for though we are by no means *certain* that matter can evolve life; yet, in the present imperfect state of the sciences on which biology depends, it is not unreasonable to expect the future demonstration of material attributes superior to what we can as yet suspect, expect from speculation concerning their supposed effects. It is this prematurity of conclusion—the hasty desire for explanation before the strict laws of logic warrant—that we deem the chief fault of the book. It is really akin to the errors of ultra-positivists; the differences being, that whereas they try to fit every phenomenon into accordance with their well-established though too narrow laws, he produces an efficient law by fiction of the imagination.

His philosophical position therefore differs from that now tending to prevail in being dualistic, not monistic. Were it not so, his position would have close affinity with the idealism of Schelling and Hegel; or the modifications introduced by Schopenhauer and Hartmann; a class of philosophy with which (apparently Hegelianism) he acknowledges, in one or two places, his sympathy (p. 412). For the same reason he, as he takes the trouble to assure us, is not a Pantheist, for he denies consummate power to material substance.

Because he alleges the absolute distinction of intelligence from matter, we cannot identify him with Hartmann, to whose 'Philosophy of the Unconscious' his position otherwise bears the strongest resemblance; in that it expounds how an unconscious intelligence becomes conscious in the course of its evolution; but Hartmann identifies intelligence with matter and energy as the absolute reality. They are especially alike in the view taken of, and position assigned to, the Darwinian theory. An important difference of Murphy from Hartmann is the power of distant foresight which he supposes the intelligence occasionally to exercise: it is this latter opinion that gives Mr. Murphy such a peculiar position as compared with

the philosophical systems referred to; and it also brings him into close relation with the formerly dominant teleology of Paley and others. His proof of this clairvoyance seems to us sadly lacking in weight; but we admit the soundness of his conclusions if he could establish complete demonstration of such a case. Briefly stated then, his position seems to be a dualistic (designer *versus* realised plan) teleology, modified by concessions to monistic evolution, and with a suppressed inclination to absolute idealism.

Before concluding, we desire to express our great satisfaction with the style of the book; not merely as to the manner of its composition (it being very readable), but also to the spirit in which the argument is conducted. For, though frequently expressing his dissent from currently accepted opinions (both orthodox and heterodox), yet his language is free from bitterness and animosity; and though he often dogmatically announces his own opinions, yet it is done so frankly that he disarms us from fear of lurking prejudice; and it is evident that the author is stimulated in thinking and writing by that purest of virtues, the desire for the acquisition and propagation of truth.

F. L. Benham, M.B.

The Brain and its Diseases. Part I. *Syphilis of the Brain and Spinal Cord.* By T. S. Dowse, M.D. London: Baillière and Co., 1879.

The remarkable advance of pathology is to be seen in many ways, but in none more than in the direction of work in the great asylums—asylums for the insane, the aged and the incurable. Twenty years ago it was sufficient to have changed lunatic asylums from dungeons into hospitals: the reform of workhouse infirmaries dates from a still more recent time, and the proper care of incurables has yet to be undertaken. The administrative reform of such retreats is then barely accomplished, and the use of them for scientific observations must follow these more obvious reforms. Even at present, although lunatic asylums have been first in administrative reform, yet

in by no means all of them, perhaps not in many of them, is scientific study adequately encouraged. The names of a few asylums which have rapidly advanced in this direction occur at once to the readers of 'BRAIN;' but we fear the very distinction of these presents some of the brilliancy of contrast. The wealth of pathological material lying unheeded in our workhouse and incurable wards is enormous; and Dr. Stretch Dowse is already favourably known as one of the first of the profession to "exploit" the riches of such hospitals as the Central London Sick Asylum at Highgate. It is interesting to add that in his preface Dr. Dowse acknowledges a debt to the nurses of that hospital, "without whose vigilance and kind co-operation many of the minute clinical records would not have been fully brought under observation." Such an acknowledgment as this seems peculiarly honourable to both parties, and to mark as great a reform in the quality and self-respect of the nurses as in the attitude of the resident physician no longer possessed with the desire to keep those nurses 'in their places.' The invention of the clinical thermometer alone has done more than any one other thing to elevate the nurse and to bring her work into harmony with that of her medical directors. Dr. Dowse may therefore be said to have had one of the first chances in England of developing the resources of a sick asylum, after the example of Dr. Charcot at the Salpétrière; and, without the presence of the volume now in our hands, he has shown already that he was not only alive to his opportunity but capable of taking advantage of it. It would appear from the title-page that Dr. Dowse intends in this and succeeding parts to complete a survey of the "Brain and its Diseases"—an arduous task, in which we wish him success and a long life. The author has begun his task by publishing an essay "On Syphilitic Disease of the Nervous System," and this essay is the subject of our present article. Its contents are: The history and nature of syphilis; the diagnosis of syphilis of the brain and spinal cord; the diagnosis of syphilis of the sympathetic system and of the peripheral nerves. Then follow chapters on the treatment of syphilis, on hereditary syphilis, and on syphilitic epilepsy. The chapter on Pathology closes the work, an arrangement which seems to

have commended itself more strongly to the author than it is likely to do to his readers. The chapter on the nature, or, as it would be better entitled, on the features of syphilis, contains but little, and that little does not profess to be novel. Yet what is said has the force of the master of legions, for Dr. Dowse speaks with ten thousand patients at his back (p. 4). Hence dicta of the following kind have from him a weight which they would lack in the mouths of less fortunate observers—namely, that hard and soft sores alike may be followed by constitutional symptoms, among which may also come the hardening of the seat of the forgotten or half-forgotten primary abrasions; that shocks physical and mental may determine the appearance of a syphilis dormant for years previously; that among the several indications which betray a syphilitic habit a thickening of the rectum takes as high or a higher place than choroidal patches, faint keratitis, lingual psoriasis, and the like; that active syphilis does not ally itself with gouty, rheumatic, tubercular, scrofulous, or even cancerous diatheses, but rather suppresses them; that syphilis of the nervous system (excluding the osseous system), and of the thoracic and abdominal viscera seem to stand almost inversely to each other; that under adverse circumstances changes from period to period are so rapid in syphilis and so indefinite as to bewilder the observer trained in the stricter schools; and so forth. Such points as these are given forcibly and simply, and only so far as may be needed for the purposes of the book itself. Under diagnosis of syphilis the ophthalmoscopic signs are incompletely described, and scarcely advance, if at all, upon the records of ten years ago; and we should have been glad to know more of Dr. Dowse's experience of percussion of the skull. In the chapter on Diagnosis the reader will probably turn aside from the well-known forms of cerebral syphilis affecting the Sylvian regions, the orbital nerves, and so forth, and will turn to see what is said of the forms more recently discussed and more anxiously watched—what is to be made out of syphilis of the cortical regions and of the pia mater; what of the distinction between syphilis of the frontal and fronto-parietal convolutions as opposed to general paralysis of the insane, and to sclerotic degenerations in and

about the medulla oblongata; and what of the far-reaching disease of the middle and inner coats of the smaller arteries, lately described by Heubner, and in 1868 by the present writer in 'St. George's Hospital Reports.' Dr. Dowse does not fail us in these inquiries; and we may confidently refer our readers to these sections of his volume, which are full of instruction, and, like the whole of the book, are based upon an excellent selection of recorded cases. Many of Dr. Dowse's recorded cases will have indeed a classical value, however far the comments upon them may be superseded by his own later work and by later authors. Dr. Dowse goes so far as to say (p. 26) that "certain diffuse changes, revealing psychical derangements, are rarely associated with other than syphilitic growths when combined with objective signs of paralysis." I think most physicians will admit that such cases have hitherto been to them food for conjecture rather than of certainty. On page 32 Dr. Dowse states that "hyperplastic inflammation of the pia mater of the cord is not so uncommon in the second stage of syphilis," and cases are given; and he denies that paraplegia, if syphilitic, is a late event in any case. On the contrary, he says, "it is rare to find a true paraplegia unassociated with brain disease, and seven years after the primary manifestations" (p. 35). This, on reflection, I certainly think is borne out by my own experience, though I had not arrived at such a generalisation. On the other hand, I would urge that myelitis occurring in the course of syphilis as a rule seems to fail in showing the meningeal and vascular changes we look for in syphilis.

In a paper in the third volume of 'The West Riding Asylum Reports,' on "The obscurer Neuroses of Syphilis," the reviewer ventured to attribute to syphilis certain disorders of the temper, of the spirits, of the sympathies, and the like, as well as sleeplessness, simple epilepsy and other simple neuroses, so that he finds a special interest in Dr. Dowse's chapter on hypochondriasis, hysteriform states, sympathetic depression, and so forth, as events in the course of syphilis. Interpretations of this kind are as yet hazardous and difficult, but the facts of their coincidence with syphilis and of their cure by antisyphilitic treatment are too many to be neglected. It is curious that so

little seems known of syphilitic disease in and upon the peripheral nerves; of such disease Dr. Dowse gives some interesting examples. The chapter on treatment betrays the skilled and independent hand of one who is superior to routine in therapeutics, and who knows the limit of his powers; and this chapter cannot be read without profit. In the author's estimation mercury still holds the high place in which it has long been placed by competent physicians; but the reader will be a little surprised to find mercurial baths and inunctions so summarily dismissed, and nothing whatever said of the treatment at Aix-la-Chapelle. The chapter on Pathology abounds with interesting cases, and sets forth our knowledge in this department with decision and clearness. Dr. Dowse is not disposed to regard syphilis as being injurious to the larger arterial trunks. This first instalment of Dr. Dowse's work is then welcome as a solid and able contribution to the literature of cerebral disease, and as a contrast to the flimsy and useless treatises which issue so profusely from the bookshops of the present day. The volume is well got up and the type is good; moreover the pages are cut, which is a piece of finish not to be overlooked. On the other hand, the letterpress is full of small errors, due to careless printing and proof-reading, errors which are scarcely to be excused: for instance, the last line of page 25 has no continuation that can be discovered. The index is equally ill done and incomplete: for instance, no reference to the *spinal cord* finds a place in it at all. These blemishes can easily be remedied in the second edition, which will surely be called for.

T. Clifford Allbutt.

Hume. By Professor Huxley. Macmillan & Co. London, 1879.

A small book by a great mind, this might be called the handy-book of metaphysics, at least of so much as is comprehensible by common souls. Professor Huxley, stooping to conquer, excuses himself for the fact that in this little treatise more is seen of his thread than of Hume's beads, on

the ground that he is possessed by "an ineradicable tendency to make things clear." Hume himself is clear and strong, "without o'erflowing full" like the Thames; and Professor Huxley punts us down the great river of thought with a love of truth equal to that which artists have for beauty. And what infinite charms there are in the streams of argument and the reaches of wisdom through which we glide so pleasantly under patient and appreciative and skilful guidance. Passing the pleasing biography of the genial and kindly "subject" to the first chapter on his philosophy, is an attempt made by his critic to depict the object and scope of philosophy, reducing the three aims of philosophy propounded by Kant—What can I know? What ought I to do? For what may I hope?—to the first alone. Science, inquiring what do I know? gives the results of thinking. Philosophy, asking what can I know? investigates the processes of thinking as to with what they are and what they can do.

It is curious how strongly we are bound by the senses in the phraseology of mental facts; thus in the first pages we have "the contents of the mind"—"the psychical phenomena of life." A great, if not an insuperable difficulty in writing of metaphysics is to free ourselves from the terminology of empiricism, so that Huxley writes about a psychical phenomenon as if it were not a monster of speech. Neither is it to him; for further on we find that he means thereby merely a mental event, and that he has proposed the term *psychoses* for what Hume calls perceptions, internal events which no one else can know, but the like of which we attribute to others, because we see in them the like effects.

It may be that Professor Huxley insists somewhat too strongly upon "the close and intimate connection between psychology and physiology," for it is not certain that the philosopher may not deal with the problem of the contents of the mind without much knowledge of the physiology of sensation. The physiology of sensation, so far as it is known or perhaps knowable, stands at the gates of mind, and great philosophers have been and perchance may be but slightly instructed thereupon. Sensation is the basis of mind, but the physiology of sense is quite another thing, and it is con-

ceivable that wholly different organs of those we have might have been evolved for serving the senses. It is true we cannot see without the eyes; but there is no philosophical reason why we should not have been made to see through the nerves of the epigastrium. Physiology stands in the outer court of philosophy, but it does not enter the temple. Neither does it seem quite certain that "the methods of investigation which elucidate the true relations of one set of phenomena (the physiological) will discover those of the other" (the psychical). Rather it would seem that it is not so, for the objects of investigation in the one case lend themselves to repeated and varying observation and verification; the same objects being capable of investigation by many observers, while the subjects of investigation in the other cases never exactly repeat themselves, can only be purposely varied within narrow limits, and can by no means be observed by more than one observer. The fact "that the men who have made the most important additions to philosophy—such as Descartes, Spinoza, and Kant—have been deeply imbued with the spirit of physical science" only proves that great minds are largely omnivorous. It would be just as likely in the future that philosophers should be great politicians as physicists, if the public should ever be brought to the belief that the clearest minds would be likely to make the best laws, and the ablest men the most efficient executive.

Indeed there would seem to be less congruity between physical and mental research than between the latter and any other kind of investigation, unless it be mathematics. And this opinion is perhaps not inconsistent with agreement in the author's tribute of gratitude for the efficient aid which physical science has afforded in fighting the battle against metaphysical and other superstitions.

"Physical science in the last fifty years has brought to the front an inexhaustible supply of heavy artillery of a new pattern, warranted to drive solid bolts of facts through the thickest skulls." Physical science has also routed the horde of ghostly ideas and conceptions of spiritual existence which, with spectral wings, have darkened the fair field of human life. Once all men were materialists, more or less, and even

the framers of the Apostles' Creed made the resurrection of the body a dogma of faith. Then came the spiritualists with their "entangling brambles of superstition." Then came physical science to prove the worth of the body, and that mind was but one of its qualities. But to the investigation of this quality, its genesis, and its modes, which, is metaphysics, the methods of physics are but adapted to the earlier stages of the journey in teaching us the physiology of sense and the localisation of thought. It may be that the molecular movements of the brain which result in thought will hereafter be discovered, but the method whereby it will be discovered will not be metaphysical. Trué it is that upon this basis of sense must be built the whole superstructure of metaphysics. There is no other foundation, and this being sufficient, the edifices of imagination must vanish, burnt out like a firework, and leaving nothing but the smoke and smell of a useless literature.

Professor Huxley, in his criticism of Hume's definition of "a mind as nothing but a heap or collection of different perceptions," says:—

"With this 'nothing but' he obviously falls into the primal and perennial error of philosophical speculators—dogmatising from negative arguments. He may be right or wrong; but the most he, or anybody else, can prove in favour of his conclusion is, that we know nothing more of the mind than that it is a series of perceptions. Whether there is something in the mind which lies beyond the reach of observation; or whether the perceptions themselves are the products of something which can be observed, and which is not mind; are questions which can in no wise be settled by direct observation."

A weighty passage this in support of the views above taken that the methods of physical science are but partially applicable to the investigation of mental products. Scientifically it is rash to apply the words "nothing but" to anything, even where physics seem nearest to the end of their task. But what kind of positive arguments can be adduced about mind and its composition? First, outside facts which all men can observe, as the fact that when the kidneys do not act the mind is destroyed. Of these many men may practically

observe the same fact, although accurately no two men do see the same fact in exactly the same way. There is always the difference of point of view if not also a difference of sense. Secondly, inside facts, which only the one individual man can observe within when they take place. In the nature of things such facts cannot be compared. The signs of them may be compared, but to what extent these signs agree with the facts themselves must always be a matter of the greatest uncertainty. Observation can get no fulcrum for its lever, no rest for its glass, and physical science with its method is excluded. Even the obscure estimate of the internal events of a man's own mind is precarious and difficult. Hume says—

"Should I endeavour to clear up in the same manner [arranged observation] any doubt in moral philosophy, by placing myself in the same case with that which I consider as evident, this reflection and premeditation would so disturb the operation of my natural principles, as must render it impossible to form any just conclusion from the phenomenon." The critic however observes that "The manner in which Hume constantly refers to the results of the observations of the contents and processes of his own mind clearly shows that he has here inadvertently overstated the case." It would be little we should be able to glean by observing other "men's behaviour in company, in affairs, and in their pleasures" if we were unable to interpret them by our own internal experience, and when it comes to comparing internal experiences, to fix if possible some standard of interpretation, it is found that no experiences in two people are quite alike, and no methods of expressing them reliable.

Hume applies this general name of "perceptions" to all states of consciousness, thereby differing from Descartes, who calls them "thoughts," and from Locke and Berkeley, who call them "ideas." By the latter term Hume designates the reproduction of mental impressions in memory. The term "perceptions" for all kinds of consciousnesses would seem convenient and correct could men agree thereunto, and it would be an immense boon to much-enduring readers if philosophers could adhere to some common terminology. Perception then, according to our author, applies not only to conscious-

ness of senses, impressions, but to that of their relation to each other. Professor Huxley somewhat alters Hume's arrangement of the elementary states of consciousness as follow:—

A. IMPRESSIONS: A. Sensations of the five senses, and of Resistance [the muscular sense]. B. Pleasure and pain. C. Relations of co-existence—of succession—of similarity and dissimilarity.

B. IDEAS: Copies or reproductions in memory, of the foregoing.

"Neither simple sensation nor simple emotion constitutes knowledge, but when impressions of relation are added to these impressions, or these ideas, knowledge arises; and all knowledge is the knowledge of likenesses and unlikenesses, co-existences and successions."

But Professor Huxley points out that the impression men call a relation has no better claim to the title of knowledge than that which we call a sensation or an emotion; that there is only a verbal difference between having a sensation and knowing one has it.

"The 'pure metaphysicians' make great capital out of the ambiguity. For, starting with the assumption that all knowledge is the perception of relations, and finding themselves, like mere common-sense folks, very much disposed to call sensation knowledge, they at once gratify that disposition and save their consistency by declaring that even the simplest act of sensation contains two terms and a relation—the sensitive subject, the sensigenous object, and that masterful entity the Ego. From which great triad, as from a Gnostic Trinity, emanates an endless procession of other logical shadows, and all the *Fata Morgana* of philosophical dreamland."

The chapter on "The Origin of Impressions" will be particularly interesting to the readers of 'BRAIN.' The subject is delightfully placed before the reader in well-chosen quotations from Hume, interlarded with Huxley paragraphs full of guidance and suggestion. There are two lines of investigation. 1st. The origin of impressions. 2nd. The steps by which they become metamorphosed into compound states of

consciousness. It might, by the bye, be a question whether they are metamorphosed or developed, whether in fact the impression does not remain as the ground of the thought.

On the first line "Descartes demonstrated that the immediate antecedents of sensations are changes in the nervous system with which our feelings have no sort of resemblance;" and Hume argues that the sensations of sight and hearing are no more like the causes of them than pain is like the steel which inflicts a wound. And he "fully adopted the conclusion to which all psychological physiology tends, that the origin of the elements of consciousness, no less than that of all its other states, is to be sought in bodily changes, the seat of which can only be placed in the brain." Perhaps Professor Huxley would not have done injustice to his convictions if he had used a more forcible word than "tends" in the above sentence.

Hume's argument against a mere casual connection between the modes of motions of the cerebral substance and states of consciousness is a delicious piece of ratiocination, which want of space alone forbids us to quote at length. The gist of it is that "we shall never discover a reason why any object may or may not be the cause of any other, however great or however little the resemblance may be between them,"—though there appear no manner of connection betwixt motion and thought, the case is the same with all other causes and effects. There is no more apparent connection *à priori* between the position of bodies causing motion than that between motion causing thought. "It is only by our experience of these constant conjunctions we can arrive at any knowledge of causes and effects" —"*à priori* anything may produce anything." "You reason too hastily when, from the mere consideration of the ideas, you conclude that it is impossible motion can ever produce thought, or a different position of parts give rise to a different passion or reflection."

In other words, the argument is this. You say that motion cannot cause thought because you are unable to see in what manner it can cause it. But we do not and seemingly can never know in what manner any one thing causes any other thing. All we do know is the succession of events. This we observe to be constant, and we come thereby to call it cause

and effect. We find this succession of events between cerebral motion and states of mind, and we have the same reason, good or bad, for looking upon this constant sequence as cause and effect as we have in all other sequences we are able to observe. All consciousnesses being preceded by cerebral change, and all material changes being modes of motion, we are compelled to believe that mind is occasioned by the motion of cerebral matter.

We have sorrowfully to confess that we cannot understand Professor Huxley's last paragraph in page 81, in which he admits that there may be a real something which is the cause of all our impressions, that sensations may be symbols of that something, "the nervous system an apparatus for supplying us with a root of algebra of fact, based on those symbols—a brain a machinery by which the material universe becomes conscious of itself." Whatever this may really mean, if it is not banter, the admission will supply a parry to the keen thrusts he elsewhere aims at the pure metaphysicians. Whatever it may mean it is not idealism, for he says truly that "the idealist confines himself within the limits of positive knowledge;" and we have no positive knowledge beyond our sensations, and the ideas they originate. We have no such knowledge of the real something, the nervous algebra and the universe conscious of itself.

The view presented to us of *Innate ideas*, both by Huxley and his masters Hume and Descartes, scarcely covers the well-trodden field of that brain-splitting controversy, which so exercised the mind of Locke. Hume thinks innate ideas must either mean ideas which are natural, in the sense of being in opposition to what is uncommon, artificial, or miraculous; but all ideas are of this kind. Or they must mean ideas contemporary with our birth, in which case "the dispute becomes frivolous; nor is it worth while to inquire at what time thinking begins, whether before, at, or after our birth." Descartes defined innate ideas to be certain ideas which arose not from external objects, or the determination of my will, "but only from my faculty of thinking," "in the same sense as we say that generosity is innate in certain families, or that certain maladies, such as gout, and gravel, are innate in others, because children are born with the disposition or faculty of contracting them."

"They are products," says Huxley, "of the inherent properties of the thinking organ, in which they lie potentially, before they are called into existence by these appropriate causes." All of which seems very much to resemble the reply which a man might make to one who denied the existence of ghosts. "Oh yes, there are ghosts," Professor Huxley might say, "for naughty boys make them out of sheets and hollow turnips, and Professor Pepper otherwise manufactures them with greater ingenuity." But the innate ideas which Locke contended against were veritable beliefs in mischievous errors. They were beliefs in "primary notions," "constant impressions, which the souls of men receive in their first beings, and which they bring into the world with them, as necessarily and really as they do any of their inherent faculties." In this sentence Locke sharply contrasts them with the inherent faculties of Descartes and Huxley, with which therefore he could not have considered them identical. They were supposed to be "truths which can be imprinted on the understanding without being perceived." To say nothing of Lord Herbert's curious list of innate principles and their characters, Locke himself says that "the idea of God is one of them, which of all others seems most likely to be innate." The moral principle is another. Nor are these all, for so recent a writer as Victor Cousin recognised the innate ideas of time and space, and wasted his brain in endeavouring to patch up a truce with them, or to make a kind of composition with their creditors, or credulators. Huxley compares innate ideas to the music which is potential in a penny whistle or an organ, and which is brought out according to the organism of the instrument, when the performer, experience, arrives; but the metaphysical notion which has led mankind such a dance is that the mind is a magic flute playing its tunes without a performer.

In his chapter on the "Nomenclature of Mental Operations," Professor Huxley does himself full justice, commenting and amending the teaching of his master with great power and acumen. "The mental faculties—which are, properly speaking, cerebral functions—are reducible to the groups of Sensation, Correlation and Ideation."

We take the liberty of abbreviating the author's sentences,

and of running them one into another, not because the author's well-known composition is not full of verve and compact, but simply because space forbids full quotation, and because we may trust the readers of 'BRAIN' to fill up the interstices.

The irritation of a nerve-fibre pulls, as it were, a bell-wire, and every sensation is the ring of a cerebral particle. If, like a bell, the cerebral ring recorded no after-sign, the only impressions of relation which could arise would be those of co-existence and similarity. The relation of succession implies memory. "But the special peculiarity of the cerebral apparatus is, that any given function which has once been performed is very easily set a-going again, by causes more or less different from those to which it owed its origin. Of the mechanism of this idealism we know nothing at present. The trains of thought which succeed each other in this ideational process are obviously dependent upon physiological conditions, and are influenced by temperament, by hunger, fatigue, stimulants, drugs, &c. The succession of mental states follows the laws of association, by which every idea tends to be followed by some other idea which is associated with the first, or its impressions, by a relation of succession, of contiguity, or of likeness." The author questions Hume's statement that the ideas of memory are more vivid than those of imagination, and that in the latter the mind "is free to transpose and change its ideas." To Hume's ideas, which are Memories and Imaginations, the author makes the important addition of Expectations, in which impressions are projected into the future. The author changes the old names of particular and general ideas into the better ones of *specific* and *generic*, and gives a subtle and effective explanation of how the latter are produced. In a complex idea formed of several impressions some of these agree with the impressions of a corresponding idea; some do not; the former acquire strength by the law of associations, while the latter neutralise each other, as in the formation of compound photographs from many sitters, the points where the faces agree are brought out strongly, and form a *generic* portrait in contradistinction to the specific portrait of any one of them, whose facial peculiarities are left

vague. This effect, however, arises from the force of repetition and not of association, so that the author's simile does not quite go on all-fours; but as he further says that a specific idea is "a mean of the series," the fact comes out that association in this case is repetition. Children have very distinct memories before they can speak, and act upon them in the formation of expectations. Knowing neither the meaning of the words "sugar-plum" nor "sweet," the infant is in full possession of that complex idea which he will afterwards form into the verbal proposition, "a sugar-plum will be sweet." Berkeley's opinion therefore, which Hume endorsed, that general or generic ideas are nothing but particular ideas annexed to a certain term, which makes them recall other ideas similar to them, can only be true of the formation of general ideas, after the use of language has modified the mental development. General ideas of sensible objects may exist independently of language.

The chapter on the "Mental Phenomena of Animals," which will be instructive and new to the public, we may pass briefly. Its teaching is comprised in the following fine sentence.

"As *comparative anatomy* is easily able to show that, physically, man is but the last term of a long series of forms, which lead by slow gradations, from the highest mammal to the almost formless speck of living protoplasm, which lies in the shadowy boundary between animal and vegetable life; so *comparative psychology*, though but a young science, and far short of her elder sister's growth, points to the same conclusion."

The difficult subject of Instinct is broached, but not much drawn upon. Indeed, it is given up as "a curious but apparently insoluble problem, whether they [the instincts of animals] are or are not accompanied by cerebral changes of the same nature as those which give rise to ideas and inferences in ourselves." In man, "hereditary mental tendencies may justly be called instincts, and still more appropriately those special productions which constitute what we call genius."

In his sixth chapter the author skims the cream from several subjects. With regard to Language, he points out the important difference between the trains of mere feelings which form the minds of speechless animals and the trains of ideas of the

signs which represent feelings, which have so potent an influence on the development of the mind of man. From Language to Necessary Truths is but a step, seeing that in a rigid analysis the latter are found to "depend either upon the convention which underlies the possibility of intelligible speech, that terms shall always have the same meaning, so that the necessary truth that A = A means only that A shall always be called A; or they are propositions the negation of which implies the dissolution of some association in memory or expectation, which is in fact indissoluble; or the denial of some fact of immediate consciousness." He criticises Hume's needless admission of difference between the relations of ideas and of matters of fact as of what are called natural and of geometrical truths. The latter Hume describes as "propositions discoverable by the mere operation of thought, without dependence upon what is anywhere existent in the universe." But, says Huxley, "Suppose that there were no such things as impressions of sight and mind anywhere in the universe, what idea could we have even of a straight line, much less of a triangle, and of the relations between its sides? The fundamental proposition of all Hume's philosophy is that ideas are copied from impressions; and therefore if there were no impressions of straight lines and triangles there could be no ideas of straight lines and triangles. But what we mean by the universe is the sum of our actual and possible impressions."

Superfluous reasons are dangerous things; like unexploded shells lying about an old battle-field they may injure the man who has first used them. Hume has employed some such, which weakens his argument about Cause and Effect. Instead of grounding our belief solely on personal experience and the habit of mental experience thereby produced, he formulates the axiom that "whatever event has a beginning must have a cause," which cannot be proved to be necessarily certain; and he also argues that cause and effect being distinct ideas, and separable in thought, "we may conceive any object to be nonexistent one moment and existent the next, without conjoining to it the distinct idea of a cause or productive principle;" which, as the critic observes, is an argument which assumes to every question at issue. In fact, the axiom of causation is, as

Huxley points out, the verbal symbol of a purely automatic state of mind, which would even be illogical if it were not constantly verified by experience; which stores up memories generating expectations in a manner which cerebral physiology may hereafter explain.

The idea of something resident in the cause which produces the effect, and which we call Force or Energy, is an addition to this idea of the necessary connection between the cause and its effect which Hume explains as "the results of the association with inanimate causes of the feelings of endeavour or resistance which we experience, when our bodies give rise to or resist motion." We energise the dead world, transferring the sentiment of a *nisus* to inanimate objects, which is not less absurd than supposing the sensation of warmth to exist in a fire. Even in ourselves we know nothing of the feeling we call power except as effort or resistance, and have no means of knowing whether it has anything to do with the production of motion or thought.

To project this notice further into the interesting and important chapters on theological and moral questions, which conclude the volume, would scarcely be suitable for the pages of this Journal. Our readers must study for themselves (as indeed we trust they will the whole volume) the chapters on Miracles, Theism, Immortality, Liberty, Morals. Suffice it to say that Hume's arguments and opinions are expounded in a masterly manner, and criticised in a just and temperate spirit, and that we have a vivid and faithful rendering of the great sceptic who has slain for us so many "dragons of the prime" that now we dare not only to stand on the marge, but to venture into the ocean of truth, as far as our powers will permit. The great favour with which Professor Huxley's little work has been received is a test of the vast change which has been wrought in men's minds since Hume wrote. To have mended the teaching of his master in many important particulars, trimming and feeding the lamp of philosophy which he carries with loving diligence, is the duty of a true disciple becoming a master to others; and this is what Professor Huxley has done and is doing to great perfection.

JOHN CHARLES BUCKNILL.

Clinical Cases.

ON SIMPLE APHASIA, AND APHASIA WITH INCOHERENCE.

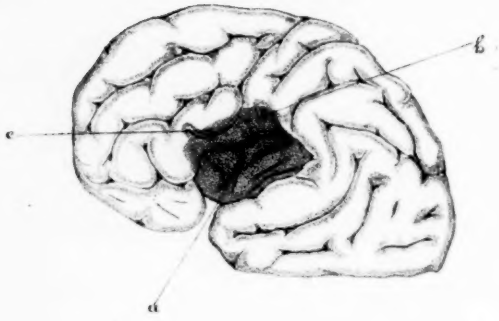
BY DR. MAGNAN,

Médecin de l'Asile Sainte-Anne, Paris.

THOUGH aphasia, or the loss of speech, commonly presents itself in a simple form, it occasionally, like other cerebral affections, exhibits complications which are deserving of study. Of three cases which I have lately observed, two are ordinary; the third, on the other hand, differs both in its physical and psychical characters. In all three, however, the pathogeny was the same, the primary cause being lesions in the circulatory apparatus. Twice the mitral valve was the seat of atheromatous abscess which gave rise to embolisms of the cerebral arteries; in the third the obstruction originated in the vessels themselves. In all the whole arterial system was the seat of atheromatous degeneration, and infarcts were found elsewhere also, in the kidneys in all and the liver in one case. The cerebral softening was situated in the left hemisphere. The third frontal was the seat of lesion, but with it also, and to a considerable extent, the island of Reil was involved. This is worthy of note all the more as the coincidence of lesion of the insula and third frontal is very common in aphasia, often, indeed, the lesion of the third frontal is slight as compared with that of the island, and in certain cases the insula alone is the seat of lesion.

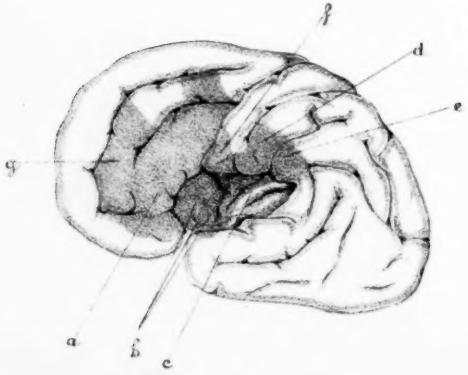
In the three cases the affection of motility was on the right side, but in one it was limited to the upper extremity.

Observation 1.



G. Paul.

Observation 2.



B. Marie fe D.

OBSERVATION I., APHASIA.—*Right hemiplegia—Mitral lesion—Plaque jaune of the whole surface of the Insula, and the posterior half of the edge and under-surface of the third left frontal convolution (old lesion)—Softening of the internal capsule (recent lesion).*

G. PAUL, basket-maker, ætat. 40, was admitted into the Asylum on Oct. 25, 1878. No history was obtainable. On being questioned he seemed to understand the majority of the queries, but he could not answer, giving utterance only to the monosyllables "Mo, Ba, Bon," indicating with his left hand that he could not speak.

On being pressed, he became impatient and burst into tears. He looked at, but made not the least effort to read, a book which was placed in his hands, and he could not write. He dragged the right leg, and could with difficulty raise the right arm. A systolic murmur was audible at the apex of the heart, and there were sibilant and sonorous râles in the chest. He seemed oppressed, but there was no fever.

On Nov. 1st he had an apoplectiform attack, with complete resolution of the already enfeebled right side and dropping of the right angle of the mouth. On Nov. 2 there was marked œdema with rise of temperature in the paralysed limbs. Deglutition was difficult, and there was a semi-comatose condition. Death occurred on Nov. 4.

Autopsy.—Membranes œdematous. Sanguineous infiltration of the pia mater on a level with the middle of the ascending frontal convolution on left side. Obliteration of the Sylvian artery at its origin, before giving off the branches to the corpus striatum, by an embolus. This was formed in its centre by a cretaceous fragment of the atheromatous abscess of the mitral valve. Round this as a nucleus there was a delicate envelope of fibrin.

Plaque jaune on the whole surface of the insula (*a* Litho.), the foot of the ascending frontal (*b* Litho.), the posterior half of the edge and inferior surface of the third frontal (*c* Litho.). Further, a frontal section showed a focus of softening in the corona radiata, a little above and outside the nucleus caudatus, and above and within the lenticular nucleus. This focus had a length of about 3 centimetres and a breadth of 4 to 5 millimetres. In addition, below this there were two small lacunæ occupying the middle of the internal capsule. The medullary substance between these lacunæ and the focus situated above, apparently normal, was seen on microscopical examination to be markedly altered, and one could discover numerous granular corpuscles, indications of advanced degene-

ration. Further back, in the parietal section, beneath the principal focus, there were lenticular nuclei, also white and indicative of recent lesion. So that the anterior third of the internal capsule was really affected, notwithstanding the apparently normal appearance of the parts between the foci of softening.

The membranes were easily separable from the whole surface of the right hemisphere, and there was no appearance of lesion on the cortex or centrally. The heart was voluminous; its pericardial surface exhibited here and there milky spots; the walls of the left ventricle were hypertrophied. The mitral valve was considerably thickened, and the auriculo-ventricular orifice was narrowed and the valve incompetent. It was surrounded by cretaceous deposits. The right columna carnea, at the point of insertion into the valve, was deeply hollowed out by an atheromatous abscess, at the bottom of which was a considerable quantity of debris ready to be propelled into the aorta. The left column was yellowish and hard at its insertion into the valve, but there were no signs of ulceration. The sigmoid valves were not rigid, and the aorta exhibited a few yellowish spots, slightly prominent but not softened. The kidneys were voluminous. The left exhibited an old infarct of about 25 millimetres in diameter and extending about 7 millimetres in depth. In cutting into the two kidneys the cortical substance was found yellowish, the medullary substance appeared normal. The liver was yellowish and somewhat fatty. It exhibited traces of an embolus.

Remarks.—The cardiac affection in this case was the starting-point of the cerebral lesions, but, though having the same origin, they form two groups quite distinct and of different dates. The large cortical lesion described above was the first, and was the cause of the aphasia and incomplete right hemiplegia; the other was the softening of the internal capsule which was the cause of the complete hemiplegia with œdema and rise of temperature on the same side. The seat of the embolus, the origin of the Sylvian artery, explains the extent of the central lesion, and its recent date accounts for the almost normal aspect when looked at only with the naked eye.

OBSERVATION II., APHASIA.—*Right hemiplegia—Softening of the third frontal convolution, of the Insula, and other parts of fronto-parietal region of the left hemisphere.*

B. MARIE f^e^ D., aged 65 years, was admitted on Dec. 31, 1877, being sent from the hospital, where her cries and excitement during the night disturbed the other patients. B. recognised objects, but she could not call them by name, and

responded to every question by the syllables "ton, ton, ra, ton, ton," accompanying this utterance occasionally with a negative shake of the head. She could neither read nor write. She was affected with right hemiplegia without loss of sensation; she was feverish, feeble, and breathed with difficulty. She died on January 16.

Autopsy.—The calvarium was of great thickness, measuring not less than 11 millimetres in the middle of the occipital. The diploe was not injected, and the bone appeared healthy. On incision of the dura mater, 120 grammes of serosity escaped. The arachnoid and pia mater were infiltrated, and here and there opalescent. The right hemisphere weighed 500 grammes, the left 442 grammes. The cerebellum, pons, and medulla weighed 148 grammes. The whole weight of the encephalon was therefore only 1090 grammes. The left hemisphere exhibited a depression in the fronto-parietal region, and through the membranes a yellowish (dead-leaf) tinge was perceptible. The pia mater separated readily from the surface everywhere, except at the softening, where it adhered. The softening occupied the whole of the third frontal (*a* Litho.), the first three digitations of the insula (*b* Litho.), the anterior margin of the fourth (*c* Litho.), while the fifth was normal. Above, from behind forwards, the lower third of the ascending parietal (*d* Litho.) and the neighbouring parts of both parietal lobules (*e* Litho.), the lower extremity of the ascending frontal (*f* Litho.), and to the whole of the second frontal convolution, excepting only about a fifth (*g* Litho.). This vast plaque of softening invaded the whole depth of the cortex, and penetrated across the insula as far as the claustrum.

The membranes separated easily from the right hemisphere, which was normal throughout.

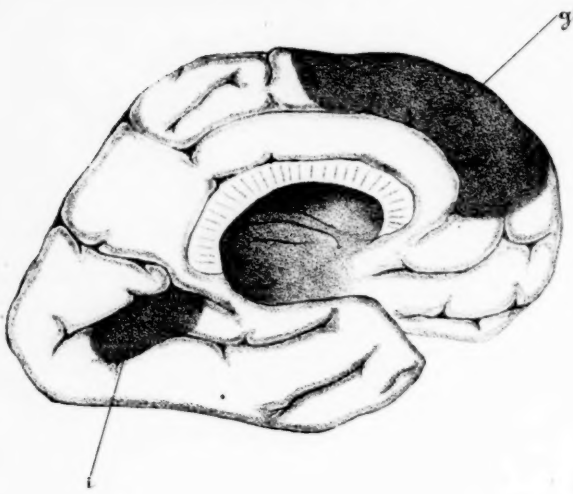
The heart was covered with fat, especially on the right ventricle; and the left cavities were filled with red fibrinous clots, the right with dark clots. The aorta was yellowish, and exhibited numerous spots of atheroma, slightly elevated but not softened. The large arteries at the base were atheromatous; and there were also atheromatous patches on the secondary arteries, in some parts invading the whole wall. The right lung was adherent posteriorly at the lower two-thirds to the costal pleura. The false membranes were red in places, and infiltrated with blood. The base of both lungs was engorged and dense. They could be penetrated with the finger, but did not sink in water. The liver was slightly fatty, and the surface granular after being stripped of its capsule. In the right kidney was an old infarct; the left was of the size of a pigeon's egg, and also marked with small infarcts.

Remarks.—The thickness and consistence of the cranium are noteworthy in this case, inasmuch as the patient was already advanced in life, and had atheromatous arteries,—conditions which favour rather thinning of the osseous tissue. If the heart did not exhibit valvular lesions as in the former two cases, yet the arteries were more atheromatous. The softening was of considerable extent, and the whole of the third left frontal convolution was destroyed. But here again almost the whole of the insula was involved. The opto-striate nuclei and the internal capsule were normal. The patient presented the ordinary symptoms of aphasia and agraphia, but, in addition, she had been seized with maniacal excitement, which caused her to be taken to the Asylum. Among aphasics, as among other patients attacked by circumscribed cerebral lesions, it is not rare to see in the course of the malady a development of delirious phases, with either exaltation or depression, sometimes even *délires circonscrits*, which completely alter the physiognomy of the patient, and render special precautions necessary.

OBSERVATION III., APHASIA WITH INCOHERENCE.—*Brachial monoplegia—Mitral disease—Plaque jaune in the margin and inferior aspect of the third left frontal convolution; the third and fourth digitations of the Insula—Plaque at the upper extremity of the ascending frontal at the base of the first frontal—Numerous plaques in other parts of the anterior region of the hemisphere.*

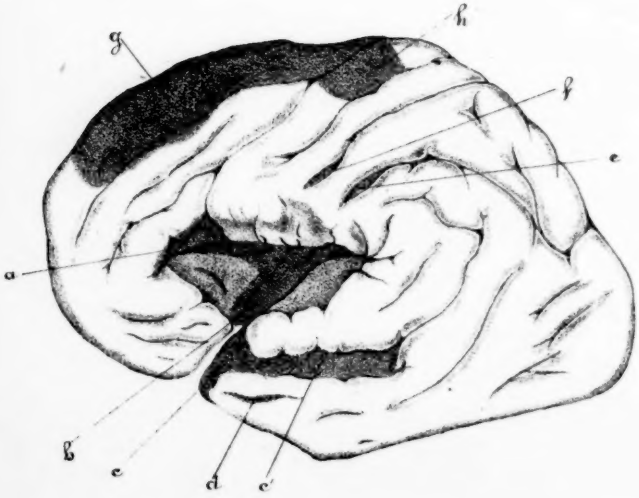
L. CLÉMENT, ætat. 42, bottler, was admitted on Sept. 20, 1878. The patient was found on the bank of the Seine, groaning, and uttering unintelligible sounds. On his arrival he responded to questions with interjections and disconnected words and syllables, a bizarre assemblage of sounds pronounced with a variety of intonation as in ordinary conversation. He appeared to follow a train of ideas, but he had entirely lost the memory of the conventional signs by which they are expressed, and he translated his internal language into an incoherent verbiage. When urged to designate by their names the objects around, he comprehended what was required of him, but he made vain attempts, and gave as every reply, "De beu, de beu, a beubeu, beu beu," which he uttered sometimes with indifference, sometimes with tears. Otherwise his attitude was singular. He held his right forearm raised and slightly bent, the hand hanging motionless. The fingers when raised fell at once. The voluntary movements of the arm and forearm were possible, but sluggish. The right leg

Observation 3.



L. Clément.

Observation 3.



L. Clément

was unaffected and its movements easy. There was no trace of facial paralysis. Sensation was normal on both sides. The patient, feeble and emaciated, seemed to have undergone great privations. On auscultation, a few sibilant râles were audible in both sides of the chest, and the first sound of the heart was accompanied by a prolonged souffle at the apex.

The patient remained till Oct. 18, presenting alternations of calm and excitement, with moans, groaning, and sleeplessness. The aphasia and incoherence continued as before. The brachial monoplegia did not recover, but an apoplectic attack supervened, followed by complete right hemiplegia. The patient rapidly succumbed, and died during the night.

Autopsy.—A small quantity of sanguinolent fluid escaped on incision of the dura mater. When this was removed, the left hemisphere was seen to be covered by a thin false membrane, transparent, but injected here and there with fine arborescent vessels. There was no false membrane on the right side. The arachnoid and pia mater were œdematous on both sides, and milky opalescent spots were visible on the middle of the convex aspect of the hemispheres in the region of the Pacchionian corpuscles. The arteries of the base exhibited here and there patches of atheroma. The right hemisphere weighed 575 grammes, while the left weighed only 485 grammes. The temporal lobe of the left hemisphere was closely glued to the third frontal at its anterior and upper extremity, and exhibited a yellowish depressed plaque, which crossed the fissure of Sylvius, and extended into the lower margin of the frontal lobe. These lobes being carefully separated from each other, the island of Reil was exposed, and its lesions rendered visible. The softening, of a dead-leaf tint, involved the lower margin of the posterior third of the third frontal convolution (*a* Litho.), the third and fourth digitations of the insula (*b* Litho.), anterior extremity of the first temporal convolution which was totally destroyed (*c* Litho.), the anterior half of the parallel fissure which has yellowish (*c'* Litho.), but on separation of the two convolutions was of a greyish tint. A small patch of softening was also seen at the bottom of the sulcus which separates the second and third temporal convolutions (*d* Litho.), and another was found at the anterior extremity of the intraparietal fissure (*e* Litho.) and at the inferior extremity of the fissure which bounds the ascending parietal posteriorly (*f* Litho.). In addition, the first frontal convolution was almost entirely destroyed within and without by a patch of softening (*g* Litho.), which, at its middle, slightly invaded the second frontal, and extended backwards as far as the ascending frontal at the point corresponding to the base of the first frontal, and slightly below

(*h* Litho.), but the highest part of the ascending frontal and the paracentral lobule were intact.

Finally, still another patch of softening (*i* Litho.) was found in that portion of the lingual lobule which bounds the cuneus.

The right hemisphere also presented a patch of softening. It occupied the anterior half of the second temporal convolution, and extended inferiorly to the middle of the third temporal, occupying a space of about 2 centimetres. In depth it did not penetrate beyond the grey substance, except slightly about the middle.

The heart was fatty, voluminous, and exhibited concentric hypertrophy of the left ventricle. The mitral valve was completely cretaceous, rigid, and both narrow and incompetent. The margin of the left valve was deeply ulcerated, and there was a large anfractuosity filled with atheromatous debris and small fibrinous clots ready to be detached and launched into the circulation. The sigmoid valves were thin and supple. The internal tunic of the aorta was yellowish, and marked by small patches of atheroma slightly elevated, but not eroded. The right kidney was the seat of an old infarct.

The spleen was small, but normal. The liver was somewhat fatty. The lungs were congested at the base and posteriorly, the right somewhat emphysematous.

Remarks.—Though no history was obtainable, yet the fatty degeneration of most of the organs in an individual aged only 42 pointed to alcoholism as the probable cause. From this, and probably also rheumatism, the mitral valve became the origin of emboli which caused the cerebral softenings. Two of these plaques, in the left hemisphere, that which affected the third frontal convolution and that which involved the upper extremity of the ascending frontal convolution, correspond to precise localisations. They sufficiently explain the aphasia and the paralysis of the arm. This double localisation was foreseen, and we expected to find either a vast area of softening extending from the third frontal up the ascending frontal, or two isolated lesions. In these relations numerous clinical facts come every day in corroboration of physiological researches. Does the incoherence depend, as some facts would seem to bear out, on multiplicity of lesions in the cortex? But where should these be situated, and what should be their number and extent? We are as yet unable to answer these questions. We know, however, that they are not to be looked for in the occipital lobes, nor perhaps in the posterior half of the hemispheres. I myself have frequently observed extensive lesions in the occipital lobes without incoherence. In a hypochondrial melancholic in particular, whose insanity was quite systematic, and had no appearance of incoherence, I

found, on post-mortem examination, two large ochreous patches covering the occipital lobes like a calotte, which extended forwards over the hemispheres as far as the temporal lobes, which were themselves largely involved. In this melancholic the sensibility was impaired but not abolished. It is therefore towards the anterior parts that we must direct our attention, and I do not doubt but that new observations carefully made will throw light on this question of pathogeny.

In the case before us the multiple lesions had transformed the cortex of the frontal and parietal lobes into a veritable mosaic, and the relations between the different parts of the cortex were profoundly altered. What then could be the result of such disorder of the different groups of associating fibres but a state of incoherence? In these facts, as in idiocy, as has been shown by Professor J. de Mierzejewsky, the cerebral lesions isolate, as it were, the different cortical regions; and instead of all being in harmony, and forming a solidarity, we see the strange spectacle of individuals, with special aptitudes perfectly developed, but isolated, and contrasting vividly with their sterility as regards other intellectual powers, appropriately deserving the name of wise idiots.

Was our patient conscious of his language, or believe that he uttered intelligible phrases? It is probable, but how is this contradiction to be explained? On the one hand, he understood what was said; on the other hand, he did not seem to be aware of the incoherence of his own language, when he gave a determinate sense to unintelligible phrases. This apparent contradiction is not uncommon among aphasics. Many of them, in fact, do not understand words, unless on active efforts to excite their attention, when they suddenly concentrate their faculties on one point. Some even succeed in repeating the word pronounced in their hearing, and indicate the object with the hand; but a moment after, when the same object is again presented, they pronounce some syllable or word which has not the slightest connection with it, sometimes recognising their error, at other times, on the contrary, not seeming aware of it.

We may add further that, clinically, we can distinguish two kinds of incoherence, the one which accompanies chronic insanity, especially chronic mania, and which does not show itself till after the lapse of many years; the other, more rapid, sometimes even sudden in its development, is the result of cerebral lesions, most commonly necrobiotic softening, characterised by apoplectiform or epileptiform attacks.

In the first form, the incoherence is the result of a functional disorder of long standing and slow progress, and the incoherence of language is in relation with the incoherence

of ideas; in the second form, the anatomical lesions rudely interrupt the regular train of functions, and so as in L., the incoherence of language is not altogether indicative of incoherence of ideas. It is a question whether in the incoherence of insanity there are also anatomical lesions. According to the results of necroscopic research, the material changes are not very evident, and histological examination discovers only comparatively unimportant changes, such as fatty granular and pigmentary infiltration of the cells, and fatty granular infiltration of the vessels, modifications which, as will be seen, do not differ from those due to senile changes.

Additional.—The above remarks had been penned when I had an opportunity of observing a new case of aphasia, which at first did not appear to differ from the common, but which, as regards the autopsy, had certain peculiarities worthy of being recorded.

APHASIA.—*Right hemiplegia—Neuroglia sarcoma of the frontal lobe.*

CATHERINE ——, aged 61 years, was admitted on the 18th of October, 1878, accompanied with a certificate from M. Lasègue, as follows: "Dementia, right hemiplegia, aphasia. Absolute inability to attend to her needs." Interrogated on her arrival, she was unable to give any account of herself. She pronounced words or monosyllables without connection, and could not name objects. She reflected, tried, became impatient, wept occasionally, but was unsuccessful; but occasionally she hit on the right name, on which her countenance expanded, and she seemed pleased at her success. She had the irritability, sensibility, and mobility of aphasics generally.

She repeated words pronounced in her hearing, and even occasionally pointed to the object when the name was pronounced in the midst of others. The relation between sight and hearing was preserved. The auditory image revived the visual image (Griesinger, Sander, Jaccoud). On the other hand, if one gave a thing a false name she detected it, and signified the same by a negative shake of the head. Internal speech therefore was retained, but its outward projection was defective.

She did not seem able to read. She held a paper in the left hand (the free one), and looked at the print, but did not follow the lines.

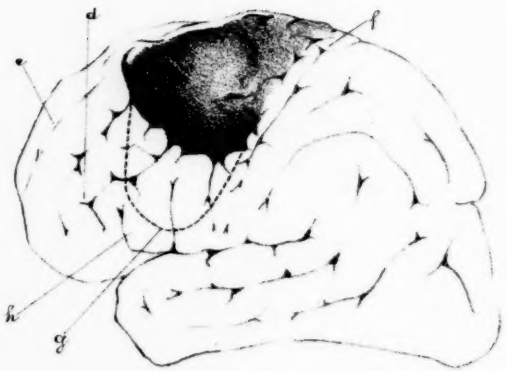
The right hemiplegia was complete; the arm could not execute a single movement, and the right angle of the mouth was slightly depressed. The radial arteries were rigid. There was a slight systolic murmur at the apex of the heart.

Fig. 1.

Sarcoma of Neuroglia

a. Dura. Mater
b. Inferior lobe where the fibrous tissue predominates.
c. Superior lobe where the cellular elements predominate

Fig. 2.



Indented Cavity in the left hemisphere caused by the Sarcoma of Neuroglia.

d. First Frontal Convolution
e. Second " "
f. Ascending " "
g. Limits of the tumour in the thickness of the left hemisphere.
h. Third Frontal Convolution.

On Dec. 10 she was found in a state of hebetude at the hour of visit. She did not hold out her hand as was her custom, and did not appear to understand questions put to her. This enfeeblement, due probably to an apoplectiform attack which had escaped notice in the night, diminished during the day, and next day she had regained her habitual attitude. On Dec. 24 erysipelas of the face occurred, followed by a semi-comatose condition, and after various changes for the better and worse, she expired on January 4.

The ensemble of symptoms left no doubt as to the cause of the aphasia and right hemiplegia. The patient having a cardiac affection, it was natural to suppose embolism and softening of the third frontal convolution of the left side, the insula, corpus striatum, and deep parts. On post-mortem examination quite a different affection was actually found.

On incision of the scalp at the level of the temporal fossa of the right side, an abscess in the tissue was discovered, of 5 to 6 centimetres in extent. The calvarium was slightly adherent at the vertex, and presented, anterior to the middle of the frontal, plaques of dull white osteitis. In addition, there was an osseous elevation on the internal surface of the left parietal, on a level with the posterior part of the left frontal region. This prominence, of a bright red colour and mammillated, was raised about 6 millimetres above the internal table over a surface of 3·5 centimetres. It was surrounded by a red zone of 2 to 3 centimetres. It depressed the dura mater, which however remained thin, smooth and polished here as elsewhere. This membrane, incised inferiorly along the external border of the left hemisphere, could be raised from below upwards as far as the upper border of the third frontal. There it adhered feebly to the other membranes. These adhesions, when broken up, which could be readily effected, exposed a tumour inserted in the internal aspect of the dura mater, by a surface of which the diameter was not less than 6·5 centimetres. This tumour, of a conoid shape, directed obliquely from below, outwards and forwards, exhibited at its middle a slight construction, which gave it a bilobed appearance (F. 1, *b c*). Resting by its base on the inner face of the dura mater, its apex penetrated deeply into the left hemisphere, which it hollowed out and displaced at the posterior half of the first two frontal convolutions, and the upper two-thirds of the ascending frontal. Of this half of the two frontals nothing more was visible than the base of insertion into the ascending frontal, and which was almost entirely effaced. The ascending frontal was deeply depressed and atrophied, principally at its middle third, and the cortex was not more than two millimetres in thickness. The tumour

penetrating the left hemisphere like a wedge, separated and displaced the neighbouring parts, and its apex penetrated as low as the third frontal, and the anterior third of the upper border of the insula. The finger applied to the bottom of the fissure of Sylvius, in the sulcus which separates the third convolution of the anterior border of the insula, found itself separated from the inferior extremity of the tumour by a thickness of cortical and medullary substance, which did not exceed 6 millimetres. The cortex of the posterior extremity of the third frontal, and the upper margin of the first two digitations of the insula, had been, as it were, dissected and isolated by the tumour. It had lost its connections with neighbouring parts, and with the greater part of the fibres of association and transmission. Notwithstanding the immediate proximity of the tumour, the cortex of the third frontal had not been softened.

The cavity of the lateral ventricle was much reduced, and adhesions had formed between the upper and lower walls in the neighbourhood of the sulcus which separates the two surfaces. The digitations of the insula, displaced inwards and outwards, had become very prominent compared with those of the right hemisphere, which were normal. The tumour had some adhesions at the base; was easily enucleable in the rest of its extent. Removed from its cavity, it measured along its oblique margin 7 centimetres, and only 4 on the opposite, which was straight. A perpendicular section showed it to be distinctly bilobular.

The larger lobe in contact with the dura mater was greyish and fibrous-looking, and a fragment examined under the microscope showed that it was composed of a considerable quantity of connective tissue, with fusiform cells. The second lobe was of a vinous red, and presented a small hæmorrhagic focus of the volume of a millet seed. It was mainly composed of polygonal cells of various dimensions, with one or more nuclei, with only traces of connective tissue.

The right hemisphere weighed 625 grammes, the left 600, and the tumour 135 grammes, so that the left hemisphere was far from having lost weight equal to that of the tumour, which had displaced but only slightly destroyed its tissue. On detaching the dura mater from the base of the skull there was visible on the middle of the petrous portion of the temporal bone an orifice of the size of a centimetre, through which it was possible to pass a pair of forceps and extract the auditory ossicles. On the upper surface of the left petrous portion, at its internal third, a second orifice of a similar character was seen. On the two sides the boundaries which limited the loss of substance were excessively thin. The dura mater at this point was neither thickened nor injected, nor were there any traces of

necrosis. Nor were any traces of syphilis visible in other organs. It is therefore probable that the two symmetrical deficiencies on each side of the most prominent parts of the base of the skull were due to a kind of interstitial absorption, caused by the compression of this large tumour, which acted perpendicularly from above downwards.

The heart was voluminous, covered with fat, and there was concentric hypertrophy of the left ventricle. The free edges of the mitral flaps were thickened. The aorta was atheromatous, and exhibited patches slightly elevated but not softened.

The lungs were congested, dense, and friable at the base, and a fragment sank in water. The liver, which weighed 1500 grammes, was free from lesion, and the capsule was smooth and non-adherent. The kidneys were congested throughout, but the capsules were easily separated.

A CASE OF CHOREA, IN WHICH DEATH WAS CAUSED BY CEREBRAL HÆMORRHAGE.

BY E. BUCHANAN BAXTER, M.D., F.R.C.P.,

Professor of Materia Medica and Therapeutics in King's College, London; Physician to the Evelina Hospital for Sick Children; Assistant-Physician to King's College Hospital.

THE extreme rarity of such an accident as hæmorrhage into the substance of the brain in childhood is of itself a sufficient reason for putting the following case on record. But it presents certain other features of importance, some of which may render it an appropriate pendant to the very interesting example of cerebral hæmorrhage in the course of pyæmia narrated by Mr. Herbert Page in the January number of 'BRAIN.'

A. R., a girl eight years of age, was admitted into the Evelina Hospital under my care on January 31st, 1878, with the following history. Her health had been uninterruptedly good, but for an attack of measles, till about three years before her admission. She then suffered from chorea for about six months. The malady cannot have been severe, for she was not confined to bed, and only attended two or three times as an out-patient. No history of fright was obtained, but she was said to have been in the habit of playing with a child who suffered from the same disorder. She had occasionally complained of pains in her legs (termed "rheumatic"), but the joints were never inflamed. There is, however, a distinct history of rheumatism on the mother's side of the family. In October 1877 the chorea returned, and the movements, though never violent enough to take her off her legs, occasionally prevented her from feeding herself. She was subsequently brought to my colleague, Dr. Hayes, who thought she looked too ill for her symptoms, and sent her into the wards at once.

On admission, there was some twitching of both hands and feet. It was quite insignificant in degree, and not more marked on one side than the other. The heart was very care-

fully examined, and its sounds were somewhat unexpectedly found to be *remarkably clear and loud, but unattended by any murmur*. On February 8, the note ran: "often complains of headache. Temperature fluctuates between 98° and 101°, without apparent cause. She can walk without help, and feeds herself. The twitching is very slight." On the 9th she ate her dinner as usual. At 4 P.M. the house surgeon, Mr. Paley, was called to her. She had just vomited, and was said to have "plunged and struggled" a good deal. He found her quite comatose, with marked rigidity of right arm and leg, which were fully extended. No convulsive movements. Pupils equal, not specially dilated, insensible to light. Face pale. Cheeks puffed out during expiration: no stertor. She never regained consciousness, and died quietly at 6.30 P.M.

Post-mortem examination on Feb. 11th.—Body well nourished. Right arm rigidly bent at a right angle; left arm rather stiff. Pupils moderately dilated: equal. Urine, drawn off from bladder, pale, somewhat turbid, yielding a distinct trace of albumen.

When the brain was taken out, a small clot was perceived under the arachnoid, just below the tip of the *calamus scriptorius*. On raising the medulla oblongata, the clot was seen to broaden out as it extended into the fourth ventricle. The brain was then turned over. On slicing the left hemisphere, a large clot, resembling black-currant jelly, was found lying in a cavity parallel with, but altogether outside, the lateral ventricle. The clot measured 3 in. in length, 2 in. in breadth, and was at least 1 in. in depth. The walls of the cavity were quite smooth, save at one or two points. It communicated by a small rent with the anterior horn of the left lateral ventricle. The rent was just in front of the corpus striatum, and did not implicate it in the least. Through the opening, a little blood had trickled into the ventricle, where it formed a long, slender, triangular clot. Moreover, a small quantity had made its way through the foramen of Monro, into the right lateral ventricle; also through the third into the fourth ventricle, at whose lower edge it had first been detected.

The original clot, as already stated, lay quite outside the ventricle. It was noticed more particularly that the caudate and lenticular nuclei, together with the internal capsule, were intact; indeed, a thin layer of the external capsule was still attached to the corpus striatum, and formed the inner wall of the cavity occupied by the extravasated blood. The corpus striatum must have been squeezed, but it was not otherwise injured. All attempts to find the exact source of the bleeding failed: no embolon, no aneurism could be detected with the naked eye. The coats of the larger arteries appeared quite healthy.

Lungs œdematous, otherwise normal. The muscular substance of the heart, its lining membrane, and its valves, were healthy, with the following important exception: along the lower edge of the posterior segment of the mitral valve, on its auricular aspect, there was a close-set row of small warty excrescences. At one point, a soft lobulated mass about an inch in length was attached by a relatively narrow pedicle, and hung down into the auriculo-ventricular orifice. Its texture was soft and fragile. Along the corresponding edge of the anterior flap were a few discrete prominences of the tough and warty kind.

The right kidney was much altered. A great part of its substance was made up of yellowish embolic patches, cinctured with narrow zones of hyperæmia. The left kidney contained only one similar patch of small size; the remainder of its tissue was deeply congested. Spleen large, rather soft, containing an infarct as large as a pigeon's egg. Liver and other viscera healthy.

Read backwards, the course of the morbid process in this case is plain enough. Chorea, with its usual attendant, endocarditis; detachment of vegetations from the mitral valve and multiple embolism, causing moderate fever of a remittent type. Two points, however, call for special notice: the mechanism of the hæmorrhage, and the non-discovery of the cardiac lesion during life.

To take the last first. I should never have believed it possible, before this experience, for such very coarse damage to exist in the mitral orifice without making itself manifest by a loud murmur. Had the case not been one of chorea, perfunctory auscultation might reasonably have been suspected. But we have long been in the habit of looking for a mitral murmur in every case of this disease, and of regarding its absence as exceptional. Moreover, the heart was listened to by two persons besides myself, both very competent auscultators. It is just possible that a murmur might have been heard, had the patient been examined in the erect posture; but as she lay in bed, this was not done. Still, the recumbent posture is not usually an obstacle to the recognition of serious mitral disease. Its recognition in the present instance would at once have furnished the real clue to the fever and constitutional disturbance, whose nature, as it was, remained obscure during life.

Next, as regards the hæmorrhage. That a minute aneurism may have existed, though it was not discovered, is, of course, quite possible. And that aneurisms may result from embolism can no longer be questioned, after the evidence brought forward by Dr. Goodhart and others. I believe, however, that

an alternative hypothesis is open to us in the present case. From the position and relations of the clot, it is obvious that the bleeding must have occurred from one of those long branches of the Sylvian artery which make their way upwards outside the lenticular nucleus (*lenticulo-striate* of Charcot). These vessels are all of them *terminal*, i.e. they form no anastomoses with their neighbours between their point of origin and their break-up into capillaries. The impaction of an embolon in a vessel of this kind must needs expose its walls, behind the obstructed point, to a much greater degree of pressure than could occur, under similar circumstances, in an artery ramifying in the usual way. That the lenticulo-striate arteries are ill fitted to resist unusual strain is shown by their liability to rupture in connection with general increase of arterial tension (as in Bright's disease with hypertrophied heart). Accordingly, it may be that in the present instance, the momentary increase of pressure due to the lodgment of an embolon in one of these vessels may have caused a rent behind the obstructed point, large enough to allow of very copious bleeding into a region where, as Broadbent has pointed out, hardly any resistance is offered to extravasation, "the blood only performing a natural dissection in following the line of cleavage between the corpus striatum and external capsule."[1]

[1] "On Ingravescent Apoplexy," *Med. Chir. Trans.* LIX.

SOME CASES OF NERVE RESECTION AND NERVE STRETCHING.

REPORTED BY HERBERT W. PAGE, M.A., F.R.C.S.

CASE I.—*Neuralgia of the left inferior dental nerve, cured by resection. Pallavicini's operation. Recurrent hæmorrhage. Ligature of common carotid. Various brain symptoms. (Jahresbericht, 1876, der Krankenanstalt Rudolf Stiftung.) Under the care of Dr. Weinlechner.*

A WOMAN, aged 66, had suffered during the past four years from neuralgia in the left inferior dental nerve. At first occasional, the pains gradually increased in frequency, so that latterly she was hardly ever free from paroxysms. These usually occurred spontaneously, but might be brought on by slight causes, such as speaking. They were of a sharp, burning character, and were felt along the whole left body of the lower jaw. In their earlier manifestations the pains spread also to the tongue and to the left upper jaw. All sorts of remedies having failed to give relief, it was decided to resect the nerve. Light pressure on the nerve at its entry into the dental canal was enough to produce pain, though not the terrible suffering which is so common in neuralgia of the third division of the fifth nerve. On July 12th, 1876, the operation within the mouth, following the method of Pallavicini, was performed. The nerve had hardly been isolated and drawn forwards by a thread passed round it before the most profuse bleeding came on. With much difficulty the wound was plugged, and the hæmorrhage stayed. Uncertain what vessel could have been severed, or whether the common carotid should be tied in order permanently to arrest the bleeding, it was determined to proceed with the operation, that being of prime importance. The plug having been carefully removed, there was, to the surprise of the operator, no return of hæmorrhage; and without further trouble 1.5 cm. were resected from the nerve. Neuralgia has never recurred. Immediately

after the operation there was numbness in the left lower jaw, and in the left half of the tongue, the latter being probably due to some unavoidable pressure on the lingual nerve. Half an hour after the operation the bleeding returned, but was easily arrested by plugging. The plug was removed on July 14th, on which day it was noticed that sensation of the tongue was again normal, that of the jaw being still impaired. Everything went on well until July 19th, when, suddenly at 7 A.M., bleeding came on with great fury, and before the House Surgeon could reach her the patient had lost a very large quantity of blood. By careful plugging the hæmorrhage was again stopped, but the woman was much collapsed. The plug was now removed daily, and gradually made smaller to admit of closure of the wound. On July 23rd she was allowed to go out. On July 27th, when she had pretty well regained her strength, the bleeding again came on. The wound again was plugged, this time with the addition of perchloride of iron. The patient was very blanched, and came round but slowly. Once more, on the evening of August 2nd, there was a return of bleeding, and as it seemed probable that the inferior dental itself, near its origin, was the artery wounded, the common carotid was tied on the following morning above the omo-hyoid, with full antiseptic precautions. Bleeding never returned. Immediately after applying the ligature, the left half of the face was paler and cooler than the right. In the evening the patient was weak and wandering. On August 4th, when the wound was first dressed, there was still mental dulness. The right upper extremity appeared numb, and was movable only with effort. No difference was noticed in the legs. On August 5th there was still great hebetude, with advancing "speech-disturbance." There was evident paralysis of the right arm, and to a slight degree of the right side of the face. In the afternoon the right leg was also paralysed. The pulse in the left temporal, although weaker than that of the right, had been distinctly perceptible since the previous evening. The temperature was normal, though the left half of the head was decidedly colder than the right. On August 7th the patient was more sensible. Her ability to move the paralysed limbs was beginning to return, and the right half of the face looked more natural. The aphasia (*sic*), however, was unaltered. On the 8th and 9th she still further improved. The aphasia (*sic*) had now begun to subside, although she could answer only in a whisper, and very slowly. The grasp of the right hand was still much weaker than that of the left. On August 10th it is noted that her speech was tolerably ready, and on the 12th that she was still mentally deficient, having no

remembrance of either the bleeding or the operation. After this date she gradually improved, and on August 26th she was able to walk a little alone, although she slightly dragged her right foot. On September 2nd, when she left the hospital, the patient felt pretty strong, although looking anxious and worn. The arm had fairly regained its strength; the face was almost natural; and there was no difference in the temperature of the two sides of the head. The left half of the tongue was anæsthetic. She seemed to lack mental energy and clearness.

The author remarks that similar results of ligature of the common carotid have been not rarely observed. Schuh described a case in 1848 in which twitchings and convulsions, coming on after ligature of the carotid for repeated bleedings, were followed by weakness of the left limbs, gradually passing into universal hemiplegia. Consciousness was lost. The patient died of pyæmia, and at the *post mortem* the right hemisphere of the brain was found softer and moister than the left. That ligature of the carotid is of itself insufficient to produce such noteworthy symptoms, these and many cases testify. It is probable that precedent and considerable loss of blood, as in his own case and in that of Schuh, has a potent influence in the impairment of nutrition of the hemisphere. The autopsy in the latter case shows, moreover, that a definite organic change in the brain—something more than simple anæmia—must give rise to the predominant symptoms. And this view is supported by the gradual progress, rather than the sudden onset of the paralysis.

A further note of the patient on November 27th records that in many respects she had materially improved, although her memory was still somewhat bad, and her foot was a little dragged in walking.

(Considering that the source of the hæmorrhage was almost certain, the case appears to have been one in which ligature of the external carotid would have sufficed. On this point see an important paper by Mr. Harrison Cripps on the "Treatment of Hæmorrhage from punctured wounds of the Throat and Neck," in vol. lxi. of the 'Transactions of the Royal Medical and Chirurgical Society,' and in which the author, after an exhaustive study of many cases of hæmorrhage, and of the dangers of ligature of the common carotid, urges ligature of the external carotid as a substitute, preliminary at least, for that of the common carotid in cases of emergency, and where simpler means have been tried in vain.)

CASE II.—*Neuralgia of the 3rd Division of the Fifth. Intra-oral resection of the inferior dental, buccal, and lingual nerves, followed by cessation of the neuralgia and the production of sensory and gustatory paralysis on the right fore-half of the tongue.* (*Wiener Medizinische Wochenschrift. No.* 44. 1878.)

This case is abstracted from the 'Jahresberichte der Krankenanstalt Rudolf Stiftung pro 1877,' and was under the care of Dr. Weinlechner in that institution. The wife of a shoemaker, aged 40, eight months before her admission into hospital, on Aug. 7, 1877, began to feel, during a severe cold, a sharp darting pain along the right half of her tongue. Limited at first to the tongue, the pain gradually extended once or twice daily to the hard palate and the right half of the lower jaw. Its frequency increased, and in about six weeks it recurred every five minutes or so, both by night and by day. The pain was aggravated by talking and chewing, and was greatly influenced by changes in temperature. The woman was wasted, and prematurely aged, and she had, in addition to the pain, a copious secretion of saliva. There was no difference in the sense of taste in the two halves of the tongue; nor did pressure on the inferior dental nerve at its entry into its bony canal produce any pain. During the attacks the patient found some relief by constantly rolling her tongue about. In the course of her illness several teeth had been extracted, and other means adopted, without abatement of her suffering. The galvanic and faradic currents when first applied by Dr. Mader very much reduced the pain, which now ceased at night and came on only in talking and eating. The patient herself improved in health, but it was not long before the pain returned in all its original intensity. Its character somewhat changed, for it now became more frequent and more severe in the jaw than in the tongue. The salivary flow returned; there was some flushing of the face, but no painful spot was discoverable. It was therefore resolved to resect portions of the gustatory and inferior dental nerves within the mouth; and this operation, according to the method of Menzel and Pallavicini, was performed on Oct. 10th. The several nerves having been laid bare, a piece 1·5 cm. in length was cut from the inferior dental, and the same length from the buccal nerve, which had been accidentally mistaken for the gustatory. From the lingual itself were removed 2 cm. The attacks of pain at once disappeared, and the following conditions were found on examination: along the inner and outer side of the right half of the lower jaw, on the right half of the tongue and the right half of the floor of the mouth, and of the right side of the chin,

there was complete anæsthesia. The right half of the tongue, moreover, in its anterior parts was insensible to the taste of acid and bitter substances, readily appreciated by the other half. Examination of the sense of taste at the posterior part of the tongue was impossible from swelling of the soft parts. The wound was healed on Oct. 27th, on which day the impairment of taste and of ordinary sensation were the same as directly after the operation. It was only on the left side of the tongue that the patient could feel the rough edge of a glass from which she drank, and she had to take the greatest care in eating to prevent herself from biting her tongue on the right side. When she left the hospital on Nov. 10th, ordinary sensation had somewhat improved, but there was no change in the sense of taste.

As regards this point, a similar observation has been made in the case of a patient whose lower jaw, with a part of the lingual nerve, was removed on account of a large cysto-sarcoma. Professor Brücke, who had several opportunities of examining this patient, considered it incorrect to attribute the impaired taste to the section of the *lingual nerve*, for it is possible that this sense depends rather on the fibres which make their way from the glosso-pharyngeal, by the route of the anastomosis of Jacobson, the small superficial petrosal nerve, and the otic ganglion to the gustatory nerve.

(No mention is made of the chorda tympani nerve, which some observers regard as the gustatory nerve *par excellence* of the anterior area of the tongue. That its fibres were somehow involved is shown by the hypersecretion of the salivary glands —doubtless the submaxillary and sublingual—over whose function the chorda tympani is known to have much influence.)

CASE III.—*Mimic Spasm. Stretching of the Facial Nerve. Cure.* By Dr. BAUM, Danzig. (*Berliner Klinische Wochenschrift.* Oct. 7, 1878. No. 40.)

A widow, aged 35, of healthy family, though herself delicate, having had much trouble and hard work owing to the illness of her husband and the loss of her only child, had some six years ago a sort of epileptiform attack, thrice repeated on one day. In three weeks she had another—one only, and that the last. Immediately after this she noticed that the left side of her face spasmodically contracted. At first the spasms were mostly limited to the eyelids, but they soon involved the other muscles of the face. In course of time they became more frequent, returning every two or three minutes, and were so violent that, for want of sleep, she was almost worn out.

On admission to the hospital the spasms were incessant and

regular, and lasted with varying intensity for rather more than a minute. With the exception of those of the ear, all the muscles supplied by the left facial seemed to be involved. When the spasms were unusually severe, there were also slight twitchings of the right angle of the mouth. This so much distressed her with a dread of both sides of the face becoming affected, and tonics, galvanism, and other remedies having completely failed, that she willingly submitted to the operation of nerve stretching, which was performed on July 20th of the present year. The facial nerve, after having been, under strictest antiseptic precautions, laid bare near its exit from its foramen, was found to be of a dark red colour, but in no wise thickened. Dr. Baum seized the nerve, and squeezed it pretty firmly with a pair of torsion forceps, while at the same time he drew it out of its bed. Immediately after the operation the left side of the face was completely paralysed. This condition lasted for rather more than half an hour; and there was no return of spasm. The wound healed by first intention, and the patient left the hospital in eight days. When seen shortly before the case was published—or early in October—the scar was quite unnoticeable. There had been no more facial spasm; and, as far as could be judged, the woman was completely cured.

The author fails to discover any precise connection between the facial spasm and the epileptiform attacks, which, from their non-recurrence, he is inclined to regard as of a vertiginous nature, and due to indigestion. He suggests, however, the possibility of some injury to the nerve during the fit which immediately preceded the first twitchings. In a case such as this, where the spasm is mimic and altogether isolated, a central lesion can with certainty be excluded. In this instance, moreover, there was neither constitutional illness nor any peripheral irritation to account for it. The diagnosis was fully confirmed by the appearance of the nerve; and as this itself was at fault, so local treatment was eminently called for. As regards the issue of the operation, he thinks that drawing out of the nerve from the stylo-mastoid foramen, and the substitution thereby of a healthy for an irritated portion of nerve in contact with the bony margin of the canal, must have had undoubted influence in the good result. At the same time it is his conviction that direct squeezing of the nerve-fibres themselves was of much greater value. He cannot help thinking that medical literature might have been enriched with many more successful results of nerve stretching, had operators been rather less tender and delicate in their handling of nerves at the seat of exposure. The fear of paralysis need not be deterrent, for that, should it arise, will quickly pass away.

CASE OF LOCOMOTOR ATAXY.

BY C. F. NEWCOMBE, M.D.,

Late Assistant Medical Officer, Lancaster County Asylum, Rainhill.

BUT few cases of Locomotor Ataxy associated with mental disorder have so far been recorded in this country, and the following case presented features differing in many respects from those I have seen described.

In September 1876, J. K. (single), a Liverpool cotton porter, was brought to the Rainhill Asylum, the medical certificate stating that he was "low-spirited, despondent, obstinate, and taciturn." On examination four days after admission he was found to be in fair bodily condition, of sallow complexion, and with a very melancholy expression. Both his pupils were contracted to a pin's point, and the right was of irregular outline and attached to the cornea. The chest was healthy; his tongue steady and protruded straight; appetite good; urine of dark colour and high specific gravity—no albumen; temperature normal. Patient's gait was jerky, his heel first touching the ground when he put his foot down. With closed eyes he was unable to turn or even to walk without assistance, as he at once began to stagger. Percussion and the application of a hot sponge showed that no single vertebra or skin-area was more tender or sensitive than the rest. On tickling the soles of the feet, reflex action was found to be slow, but much exaggerated when produced. Sensibility in the lower extremities was much diminished.

The patient's account of himself entirely tallied with that contained in the following extract which Dr. Davidson kindly allowed me to make from his Case Book.

J. M. K., æt. 35, single, porter, admitted into the Northern Hospital, Liverpool, Sept. 18, 1874 (under the care of Dr. Davidson). Patient's complaint is pretty evident, consisting of ataxic symptoms which have the following history.

About the middle of January of the present year he first felt his feet cold and a sense of numbness in them; shortly after, he began to experience difficulty in locomotion which made

him give over work. In about a month he began to have a springing sensation in the soles of his feet, so that he tended to fall forward, and felt as if he was walking on poultices. About the end of January, when going to church he noticed that he had great difficulty in going up the steps. At present he does not find it much more difficult to come up than go down stairs, if the steps are broad, but when they are narrow he finds the truth of Virgil's line

> "Sed revocare gradum, superasque evadere ad auras
> Hoc opus, hic labor."

He was several months under medical treatment, and took various patent medicines, such as "Blair's pills," and £5 worth of Dr. Swedor's "Vital Regenerator." Has had 5 weeks' application of the faradic current applied six times a week for about ½ hour each day. Has also had many salt-water baths.

Previous History.—About 15 years ago he had a chancre and bubo, some months later a gonorrhœa, and shortly afterwards had rheumatic fever. Has always otherwise been healthy. Never had skin eruption, nor alopecia, nor sore throat.

Thinks he has been falling off in flesh of late; at present his muscles are soft and flabby. Height about 5 ft. 6 in., weight never exceeded 10 stone.

Locomotory System.—He walks with feet widely apart, carries his limbs hurriedly forward and away from the mesial line. In throwing his limbs forward his feet are powerfully extended, the heel being brought rapidly down, and the rest of the foot following with a flapping motion. He can walk pretty well on a base of 10 inches. His locomotor difficulties are increased by closing his eyes, and then when standing he has a swaying movement. He has great muscular power, and can resist with much force any interference with his limbs. His legs when at rest are often affected with irregular involuntary movements, and even the strongest efforts of patient's will are unable to overcome these spasmodic muscular contractions. He can distinguish between heat and cold, but the transmission of thermal impressions is delayed, those of heat being most so; cold is felt from 1½ to 2 seconds after impression is made, and heat felt about 3 seconds after limb is touched. The tactile sensibility is much diminished in the feet, and even painful impressions are not acutely felt. There is no special tender spot along the spine, and hot and cold sponges are felt equally throughout.

The muscular power of his arms, as tested by the dynamometer, is good, and in them the power of co-ordination is perfect. Has occasional diplopia, but this followed an injury to and operation on the right eye 20 years ago. His body is marked with small cicatrices, the result of small-pox, which he

had when 5 years old. Both pupils are greatly contracted and equally so.

Nov. 4th.—Examination of the heart reveals slight roughening with the first sound at the base.

There is some sickness, anorexia, and loose bowels; pulse 100.

Nov. 9th.—The cardiac phenomena referred to in last note are perhaps more distinct to-day. The apex is in fifth interspace, and in line of nipple. Transverse measurement 4 inches.

The cardiac dulness extends up the sternum as high as the junction of the manubrium with the body of the sternum. Over this narrow strip of dulness and at the base there is a roughening of the first sound, of a probably pericardial origin. The second sound is also somewhat harsh and prolonged.

Appetite bad, bowels rather loose, pulse weak.

Nov. 28th.—Patient feels anxious to leave to-day, and consequently is discharged.

After leaving the hospital he again tried the effects of galvanism and remedies prescribed by herbalists and others, to whom he despairingly applied for relief, but at last, finding his case considered a hopeless one, he seems to have fallen into a despondent state of mind, his temper became irritable and suspicious, and finally his friends had to remove him to the workhouse on account of his obstinacy and general unmanageableness.

He related his story slowly, in plaintive, melancholy tones, but without hesitation or tremor of the voice; appeared to have a good memory for the dates and details of both recent and remote occurrences, and when roused answered all questions readily and accurately, although when left to himself he was always absorbed in the contemplation of his own ailments.

In October it was noted that he was still very depressed and fond of solitude, that he had frequent outbursts of crying and sobbing, and at times expressed great alarm lest castration should be practised as a remedy for his disease. Nocturnal emissions occurred frequently. Patient wrote several times to his friends, his writing being of average firmness, his letters well formed and no words omitted. He had great power in his arms, and made himself useful by blacking all the boots in his ward. About a month later he complained of the pains and aches in his lower limbs being much worse, and attributed them to the action of workmen in the ward who "were killing him with their raps and taps." At night he occasionally became violent, the snoring of his neighbours sounding in his ears as the voices of "Roman Catholics telling him to curse his Queen and the Protestant religion."

For many months after this his mental condition remained stationary, although his bodily symptoms were steadily pro-

gressing. He complained of double vision, though the axes of his eyes were to all appearance parallel. He began to have suspicions as to his food being drugged, and frequently struck other patients, under the idea that the shocks and starts he felt in his extremities were caused by them. In September 1877, on three several occasions while he was sitting quietly on his chair, his legs became strongly convulsed without any previous warning, causing him to fall on the floor, where he lay for two or three minutes on his back, ineffectually endeavouring to check the extravagant movements of his limbs. His articulation had now become slower and rather tremulous, but mastication and deglutition were well performed. His handwriting remained firm and distinct, but words and letters were omitted. Double vision had ceased, but his sight grew much weaker. His pupils continued, as from the first, minutely contracted. He complained of having to micturate very frequently, but retained full control over his sphincters. Attacks of emotional excitement grew more numerous and prolonged, and often occurred when he was alone. He also held long conversations with imaginary personages, who used, he said, very bad language. At the beginning of the present year he began to lose flesh and to grow weaker; his memory was much more impaired; he appeared to be entirely engrossed in himself; his tones were more querulous, and he used to complain that twenty ounces of chloroform were given him by the night attendant every night. The fulminating pains were as strong as ever, but sensibility in his lower extremities had decreased, and, although he was quite unable to walk without steadying himself by walls and furniture, and even when his feet flew out laterally to the danger of passers by, his hands and arms were still only affected to a very slight degree. In March he was found to be very much weaker; he had retention with incontinence of high-coloured ammoniacal urine, which had to be regularly drawn off, when he complained that French semen was being substituted for his own. Introduction of the catheter was always painful. Speech was more affected, swallowing at times difficult.

From this time until his death on April 16th, 1878, he rapidly lost flesh, but was always able to feed and raise himself. Flexion of his lower limbs could be resisted with some power until the day before his death. Whenever the weight of the bed-clothes was taken off his legs strong spasmodic jerking commenced, and was continued until the clothes were replaced. The temperature in the axilla, which had averaged about 100° for some days, did not rise to any great extent before his death, and his lungs remained fairly healthy.

At the autopsy, made twenty-seven hours after death, the

body was found to be much emaciated. The calvarium was dense, and the dura mater adherent to it. The arachnoid was slightly thickened, the vessels of the pia mater nearly empty. The membranes were adherent only over the tips of the temporo-sphenoidal lobes. There was some wasting of the convolutions bordering on the fissure of Rolando, and a large quantity of fluid escaped on removal of the membranes and on opening the ventricles. The lining membrane of the lateral ventricles was granular, the arteries at the base of the brain normal. The brain substance was firm and healthy-looking, and the weight of the whole organ fifty-four ounces. On examination of the recent spinal cord, the pia mater was found to be congested; the cord itself wasted, and of a dirty greyish hue on removal of the membranes. On section extensive grey degeneration was distinctly seen in the posterior regions, especially in the lower dorsal and the lumbar portions of the cord.

On microscopical examination of sections made by Dr. Ashby, of the Liverpool School of Medicine, after hardening in bichromate of ammonia, the usual changes of the structure of the cord were seen, but in a very advanced stage. Corpora amylacea were numerous; and the large multipolar cells of the posterior cornua of grey matter had almost disappeared in the lower part of the cord, while those in the anterior were much diminished in size and number.

Remarks.—It was pointed out by Dr. Nichol, in the first volume of the 'West Riding Asylum Medical Reports,' that the mental symptoms accompanying locomotor ataxy are, in the large majority of instances, marked by delusions of an exalted character, and in six out of the eight cases he describes, or quotes, these were present. In the case of J. McK., however, there seems to have been no period during which he experienced pleasurable emotions dependent upon the feeling of power. On the contrary, great depression due to the sense of growing weakness characterised his history throughout.

Most of his hallucinations and delusions, too, were apparently due to perverted sensations; the brain receiving abnormal impressions from and through the diseased sensory-tracts, and referring them wrongly to peripheral influences.

In addition to the slight nature of the changes that were discoverable in the brain itself, it is worthy of remark that this organ weighed nine ounces more than the average weight of the brain in 197 cases of general paralysis, and ten ounces more than the average weight of the brain in 700 cases of all varieties of insanity, as recorded by Mr. Crochley Clapham, in vol. vi. 'West Riding Asylum Medical Reports.' 'The Weight of the Brain in the Insane,' by C. Clapham, L.R.C.P., &c.

Abstracts of British and Foreign Journals.

Progressive Amyotrophic Bulbar-Paralysis, and its Relations to Symmetrical Sclerosis of the Lateral Columns. E. Leyden. (*Arch. f. Psych.*, viii. p. 641.)—In this paper the author gives a short account of the history of progressive bulbar-paralysis, and discusses its symptomatology, pathological anatomy, and pathological physiology. Its pathological anatomy was almost unknown to Duchenne, who thought it a peripheral affection of the muscles. Bärwinkel argued that as the faradic irritability of the muscles remained intact, the lesion was probably central and seated in the medulla. Then Wachsmuth, from an analysis of the symptoms, concluded that the lesion was in the medulla in the vicinity of the nuclei of Stilling, and was of a similar nature to the grey degeneration of the posterior columns seen in tabes. Trousseau next observed macroscopically the increased consistence of the medulla, and he and Wachsmuth found fatty degeneration in the roots of the hypoglossal, vagus, and facial nerves. Charcot, Duchenne and Joffroy, and the author almost contemporaneously recognised in addition to the lesions of the muscles and nerve roots, degeneration of the motor strands of the spinal cord, atrophy of the grey matter of the anterior cornua, and disappearance of the multipolar ganglion-cells in these cornua and in Stilling's nuclei.

The following is a summary of the pathological appearances observed in the five cases that were under the author's care, and two of which are very carefully reported in this paper:—(1) The muscular atrophy was most marked in the tongue, then in the lips, and next, in the hand and fore-arm. It was a simple, unequally-distributed atrophy, some fibres being very small, others almost of normal breadth. (2) The motor nerves were degenerated in every part of their course, from origin to termination. The nerve fibres themselves were affected, the interstitial tissue and the nerve-sheath remaining normal. Two stages of the process

were noticed,—first, fatty degeneration; second, sclerotic atrophy. The nerves presented similar appearances to those observed in the motor nerves after Wallerian atrophy. (3) The posterior columns, posterior nerve-roots, and posterior cornua of the cord were unaltered (in one case there was a thin strip of sclerosis on the inner side of each posterior column). There was marked degeneration of both pyramidal strands; and the remaining parts of the antero-lateral columns, comprising the intraspinal motor fibres of Flechsig, were degenera'ed, but in a much less degree. The degenerative process could be detected in the decussation of the pyramids, the anterior pyramids, and the pyramidal fibres of the lower half of the pons. It could not be discovered in the upper part of the pons. Microscopic examination of the affected strands showed a considerable diminution in the number of nerve fibres, and those that remained were atrophied. There was very pronounced atrophy of the large ganglion-cells of the anterior cornua, especially in the region of the cervical enlargement. Charcot, Duchenne, and others regard these ganglion-cells as trophic centres for the motor fibres, and attribute the muscular atrophy to disorganisation of them. The cells of the lateral portions of the grey matter and of Clarke's nuclei were always intact. There were fewer nerve fibres in the grey matter than there are normally. In the medulla oblongata the nerve-nuclei of Stilling were atrophied, and presented appearances analogous to those found in the anterior cornua. These changes were beautifully seen in the nuclei of the hypoglossal. In the nuclei of the facial, vagus, and accessorius they were not nearly so marked.

The distribution of the principal lesion is remarkable: it is symmetrical, and, though wide-spread, is limited to the *motor* cells and fibres of the spinal cord and medulla oblongata. It is an instance of a lesion attacking a particular physiological system of fibres (Flechsig). The morbid process is essentially a chronic parenchymatous degeneration, commencing in the nerve cells and spreading along the fibres connected with them, any changes that there are in the neuroglia being secondary. In far advanced cases, the lesion had the character of sclerosis; in less advanced cases, it was very similar to the descending degeneration of Türck. The process does not always commence in one place.

After noticing the correspondence between the symptoms and the lesion in the cases described by him, the author draws attention to the points on which he differs with Charcot. According to the latter, the progressive muscular atrophy is preceded by paralysis;

according to the former, the atrophy is primary, and is never preceded by paralysis. Again, the two authors differ as to the type of the muscular affection. Charcot describes a tonic (spastic) paralysis with rigidity, spasm, and contracture; Leyden, a paralysis with relaxation (atonic paralysis). Charcot's view,—that contracture and muscular spasms are caused by sclerosis of the lateral columns,—is adversely criticised, and the conclusion arrived at, that degeneration of the lateral columns is not necessarily followed by contracture and rigidity, and that therefore these symptoms are not pathognomonic of the lesions in question. Indeed, the same symptoms have been found by Leyden, Kilian, and by Charcot himself in cases of diffuse sclerosis (diffuse chronic myelitis) of the whole spinal cord.

In an appendix to the paper, the author gives abstracts of the cases of progressive amyotrophic bulbar-paralysis (including his own five cases, twelve in number) that have been reported. Then follow three cases in which the course of the disease was somewhat abnormal, and, lastly, two in which there was no lesion of the lateral columns.

A New Theory of Locomotor Ataxia.—In a preliminary communication to the *Centralblatt für Med. Wissensch.*, Dec. 14, 1878, Dr. Takács gives the following conclusions as the results of clinical and anatomical investigation:—

(1.) The grey degeneration of the posterior columns which is almost always found in tabes is a secondary process; the primary affection is an atrophy of the posterior nerve roots and posterior cornua, or a *meningitis posterior.*

(2.) The most constant of the derangements of sensibility is the very slow conduction of sensory impressions. This is never absent, whereas anæsthesia (hyl æsthesia) is often absent.

(3.) The posterior columns conduct tactile impressions only; and the grey substance normally conducts only sensations of pain (Schiff). But after pathological alterations of the posterior columns the grey substance can act vicariously for them, and conduct tactile impressions (Friedrich). The rapidity of conduction is now, however, diminished.

(4.) In a normal movement, the muscles contract, not with a jerk, but gradually and with an intensity varying continually until the aim of the movement is accomplished. This every-varying intensity of contraction is produced by the ever-varying intensity of the impulses that are sent from the co-ordinating centres to the muscles along the motor nerves, the intensity of the impulses,

again, being regulated by the impressions the sensory nerves convey of the phase of muscular movement attained.

(5.) If, however, the conduction of these controlling sensory impressions is delayed, the impulses excited by them in the co-ordinating centres will likewise be delayed, and, as a consequence, the muscle from an already attained phase of contraction will sink back to an earlier and lower phase, &c. . . . in other words, the movement will be ataxic.

(6.) In tabes, the delay in sensory conduction is due to the fact that the function of the degenerated posterior columns, which normally are rapid conductors, is performed by the more slowly conducting grey substance.

(7.) Where the posterior columns alone are degenerated, there is only ataxia; but where the posterior cornua and posterior roots are also affected, in addition to the ataxia there is anæsthesia (hypæsthesia).

[This scarcely seems to agree with conclusions 1 and 2.]

Progressive Muscular Atrophy. Lichtheim. (*Arch. f. Psych.* viii. p. 521, abstract by Bernhardt in *Centralblatt*, 1878, No. 50.)—In a case of progressive muscular atrophy observed by Lichtheim the muscles presented the typical histological appearances of muscular atrophy, but the nerves, peripheral and central, were perfectly normal. A most careful microscopic examination failed to detect either atrophy of the large ganglion-cells of the anterior cornua, or alteration in the cervical ganglia of the sympathetic, or in the anterior roots of the spinal nerves. Lesion of the ganglion-cells of the anterior cornua, therefore, is not a necessary condition in cases of progressive muscular atrophy; and, as Friedreich remarks, in many, perhaps in most cases, the spinal changes are to be looked upon as merely secondary, the primary affection being the changes in the muscles. The nearly allied pseudo-hypertrophic paralysis, Lichtheim agrees with Charcot, Cohnheim, and Eulenburg in regarding as a peripheral affection. As primary affections of the anterior cornua, he includes only (1) acute atrophic spinal paralysis (infantile paralysis, and the analogous affection in adults), (2) subacute atrophic spinal paralysis (subacute anterior spinal paralysis of Duchenne), and (3) chronic atrophic spinal paralysis.

Multiple Cerebro-Spinal Sclerosis. Dr. Claus. (*Allgem. Zeitschr. f. Psych.*, 1878, p. 335.) Claus reports a case in which

after death multiple cerebro-spinal sclerosis was found. General paralysis had been diagnosed, the diagnosis being founded on the mental condition of the patient, his defective articulation, which resembled that observed in general paralytics, and the course of the paralysis, which was at first remittent, but afterwards became progressive and general. Further, that the spinal cord was specially affected seemed evidenced by the existence of sensations of tingling, &c., in legs and arms, the diminished power of localising tactile sensations, and the increased reflex excitability. But the idea of cerebro-spinal sclerosis was not entertained on account of the absence of some of the more typical symptoms observed in that disease, *e.g.* the peculiar scanning articulation, diplopia, nystagmus, rigidity and contracture of muscles. Tremors were only observed once, and then but for a short time in the right leg. There was slight weakness of sight, and hearing was somewhat impaired on the left side (in 41 cases of cerebro-spinal sclerosis, the records of which were examined by Claus, hearing was only implicated twice). This case shows that what are described as the characteristic symptoms of cerebro-spinal sclerosis may be absent or very little marked during life, and yet after death very distinct and wide-spread evidence of its presence be found. At the *post-mortem*, in addition to the nodules of sclerosis, there was adhesion of the pia mater over the frontal and the ascending frontal convolutions.

The Influence of the Central Nervous System on the Irritability of the Motor Nerves. Th. Rumpf. (*Arch. f. Psych.* viii., p. 567, and *Centralblatt*, 1878, No. 50.)—The author experimented on frogs with the ascending current. He found (1) that the muscular contraction produced by breaking of the current comes on later if the motor nerve is connected with the spinal cord than if it is separated from it. The connection between the nerve and the cord was severed by simple section of the nerve, by destruction of the part of the cord from which the nerve arose, and by the destructive action of ammonia. The last method has the advantage of destroying the conducting power of the nerve without causing any muscular contraction from its irritation. Decapitation did not affect the results of these experiments. (2) After the application of cold to the spinal column for fifteen to thirty minutes the breaking contraction is still later in its appearance. (3) The same effect follows separation of the head and vertebral column from all other parts of the body, with the excep-

tion of the leg operated on, during the first fifteen to twenty minutes. (4) These results are not due to reflex action through the sensory roots, for they were obtained after the use of chloral, and after section of the sensory roots. The author concludes that in motor nerves connected with the spinal cord, influences are at work which are not observed in motor nerves separated from the cord, one indication of the existence of these influences being the modification of the electrical irritability of the nerve. Whether these influences are identical with those that regulate the tonus and nutrition of nerves and muscles, it is impossible to say. Erb thinks that the motor strands in the central nervous system are distinct from the trophic apparatus, since there are cases of central paralysis, with and without atrophy; and, on the other hand, cases of atrophy and degeneration of muscles with central lesion, and yet no paralysis and no loss of the irritability of the nerves supplying the muscles: and, further, since a muscle can degenerate while its nerve remains intact, he thinks that both nerve and muscle have a separate trophic apparatus.

Clinical observations tend to show that in man also the muscular contraction produced by breaking an ascending current comes on at an earlier period if the nerve is not connected with the spinal cord. Two cases of peripheral paralysis of the radial nerve are recorded, in both of which there was a heightened irritability of the injured nerve at the break of an ascending current. As the paralysis disappeared, the nerve returned to its normal state. In cases where the paralysis has existed for a considerable time, and where the electrical irritability of the nerve is much diminished, the heightened irritability just mentioned is no longer found.

In the secondary muscular atrophy that so often follows joint affections, the electrical irritability of the nerve is less for currents of all kinds. Rumpf agrees with Paget and Valtat in regarding this and the muscular atrophy as a reflex phenomenon due to an arrestment of the action of the spinal cord by the strong sensory impulses that reach it from the affected part.

W. J. Dodds, M.B., D.Sc.

Pathological Lesions versus Motor Centres.—Dr. Dario Maragliano has reprinted his paper from the *Rivista di Freniatria*, one moiety of which we have noticed in a previous number (Part III.). He pursues his argument in favour of the localisation of motor centres in the hemispheres, and gives at the end of his pamphlet the following deductions:—

(*a.*) The movements resulting from excitation of the grey matter of the cortex cerebri cannot be owing to diffused currents acting on the underlying parts.

(*b.*) The hypothesis of Schiff, who regards the excitable points of the cortex as centres of tactile sensation, and that of Hitzig and Nothnagel, who make the derangements of motion following disturbances of the vascular centres to be dependent upon an alteration of the muscular sense, are inadmissible, especially when we consider the results of clinical observation.

(*c.*) The hypothesis of Brown-Séquard, who denies the possibility of localising in the cortex or any other part of the brain functions of any kind, besides being a denial of all scientific progress, is contradicted by experimental and clinical results, and the facts brought to sustain his thesis are not of a kind to destroy the doctrine of localisation.

(*d.*) Those points of the cerebral cortex in which irritation is followed by motor phenomena, and whose destruction is followed by paralysis, ought to be regarded as true voluntary motor centres, capable, without the necessary intermediary of any other centres, of arousing the functions of the various muscular apparatus. These peculiar properties of the centres of the cortex and their independence of the ganglia of the base of the brain are attested both by the results of clinical and experimental observation and by anatomical researches, by the descent of the fibres of the brain and their degeneration following upon lesions of the motor zone of the cortex, and the occurrence of atrophy of portions of the cortex which have followed amputation or arrest of the development of a limb, as well as by the results of microscopic search, demonstrating the peculiarity of the structure of the motor area.

(*e.*) In man, the compensation for a lesion of the cortex, even of some extent, is possible from the opposite hemisphere, especially when the left one is uninjured; and this is effected, mainly if not always, through means of the fibres which go direct from the healthy hemisphere to the same side.

Diagnosis of Lesions of the Cortex Cerebri.—Dr. Maragliano (*Sulla Sintomatologia delle Lesioni Corticali della Zona Motrice, Reggio Emilia*, 1878) argues that we have means of distinguishing a lesion of the cortex cerebri from one of some other parts of the brain. He thinks that convulsions arising from injuries to the cortex are generally unilateral or restricted to one limited group of muscles. After the cortex cerebri, the centrum ovale is thought to

be the only one that gives origin to localised fits; but we are in want of instances of such fits resulting where the overlying grey matter is unaffected. After diligently searching medical literature, he cannot find a single example of partial epilepsy which is not owing to a lesion of the cortex. The loss of consciousness comes on late or not at all, and the paralysis appears gradually and is circumscribed, or there is hemiplegia of one side coming on gradually. The paralysis is soon followed by contractions, or is associated with aphasia, having the character of amnesia or verbal ataxia, or of verbal paralysis. There is a slight rise of temperature in the paralysed limb, and if there be a localised pain in the one part of the head, either spontaneous or brought out by percussion, then the diagnosis of a cortical lesion cannot be doubtful.

Ergot in Insanity.—Dr. Enrico Toselli (*Archivio Italiano*, Settembre 1878) has a long paper on the effects of ergot of rye in the treatment of mental derangement. He thinks that this drug produces cerebral anæmia, its action being the reverse of nitrite of amyle. In fact, he has found by experiment that, contrary to the opinion of Schüller, the cerebral vessels contracted by ergot may be dilated by the inhalation of nitrite of amyle. Brown-Séquard demonstrated that the primary effect of ergot was the contraction of the blood-vessels in all the organs in the body, as well as the contraction of the fibres of the uterus. Vokes obtains favourable results in treating hemicrania; Silva, in the treatment of cerebral hyperæmia; Crichton Browne, in the congestive form of mental alienation in recurrent mania, in chronic mania with lucid intervals, and in epileptic mania. Dr. Toselli found it of great use in treating serous diarrhœa, a frequent complication of dementia, especially in the paralytic form. In administering it for this purpose he observed that his patients passed out of the state of sleeplessness, and that their mental faculties were less obtuse. He either used the aqueous extract of the *Secale cornutum*, or the *ergotin Bonjean*, given twice during the night in doses of from 50 centigrammes up to as much as 4 grammes. He found that ergotin acted most quickly and surely in the form of hypodermic injection. Ergot diminishes the frequency of the pulse, contracts the vessels, augments the pressure of the blood, and lowers the temperature. Digitalis has more power in moderating the action of the heart, whereas ergotin has a greater effect upon the blood-vessels and in diminishing the temperature. Sometimes ergotin acts as a diaphoretic and diuretic. Sometimes the therapeutic effects have not appeared with a large dose, and

only manifested themselves when it was reduced. Sometimes the calmative effect following the use of ergotin lasted as long as a month. Toselli used the drug in thirty cases and found the most benefit from it in paralytic insanity, in chronic mania, and in dementia accompanied by agitation, insomnia, hallucination of the senses, especially when these symptoms accompany melancholia and hypochondria. He does not pretend to have cured any case of insanity with ergotin, though he thinks it may arrest the course of general paralysis.

W. W. IRELAND.

The Spinal Ganglia and Spinal Cord of the Petromyzon. By S. FREND. (*Sitzber. d. K. Acad. d. Wissensch. Wien. Bd.* 78.)—The spinal ganglia of Petromyzon and Amocœtes are, on account of their simplicity and the small number of their elements, well adapted for study in comparison with those of higher animals, and many questions of importance may thus receive a definite solution. A part of the posterior roots—about two-thirds—remains unconnected with ganglion cells. The ganglion cells are bipolar; an appearance of tripolar cells is caused by the splitting of one of the processes in some cases. Divisions of the fibres are not common. Spinal ganglia and posterior cornu form a connected whole in reference to the posterior roots. Such fibres as are clearly connected with cells in the spinal ganglia, in all probability do not enter cells in the posterior cornua, and *vice versâ*.

The spinal pia mater—in gold preparations—exhibits a delicate network of varicose nerve-fibres, which do not seem to have any relation to the blood-vessels.

Proliferations of the Ependyma Ventriculorum. T. WEISS. (*Wiener Med. Jahrbücher*, 1878.)—The Ependyma is composed first of a layer of epithelial cells which everywhere in all the ventricles, and also in adult life, are furnished with cilia. Underneath the epithelial layer there is a layer of closely interwoven connective tissue, with comparatively few, but still very distinct cells with numerous processes. The deep boundary of the ependyma is marked by vessels which run parallel with the ventricular surface. Proliferations of the ependyma and hydrocephalic effusions into the ventricles do not always go together. The excrescences are developed out of the primitive connective tissue corpuscles. First roundish cells without processes appear, which afterwards throw out processes, and thus become the knots of a

connective tissue net-work. These connective tissue corpuscles are always found in greatest abundance round the deep-lying vessels. [The author overlooks the very likely hypothesis that they may have migrated from the vessels.] The excrescences are not always covered with epithelium. On the contrary, epithelial cells are very often found in their interior. This may be accounted for in two ways; either that the proliferating connective tissue breaks through the epithelial covering, and then advances farther on the ventricular surface, or that two neighbouring nodules fuse with each other.

H. Obersteiner.

Hystero-Neuroses.—Dr. Allan McLane Hamilton (*Saint Louis Medical and Surgical Journal*, January, 1879) believes that many cases of so-called organic neuroses are examples of unusual hysteria, and he considers that the development of real organic disease after a continued hysterical condition is quite possible. In one particular instance he was assured that a degeneration of the lateral column had followed hysterical paralysis and contracture of a lower extremity. In the diagnosis of hysterical from organic conditions he calls attention to the absence in the former of symptoms which always accompany the latter. One feature, the absence of which is marked in hysterical simulations, is cranial nerve paralysis, with its numerous superficial manifestations. Dr. Hamilton brings forward one case in which the hysterical condition, accompanied by epilepsy, passing into the status, headache, erythema and cerebral vomiting, closely simulated syphilitic brain disease. The symptoms suddenly disappeared, but some of them returned along with an hysterical attack at the patient's next period. In this case there was false perception of colour—a symptom which Dr. Hamilton considers suggestive of hysteria. The writer also comments on the repeated observation of hysterical symptoms in cases of organic brain disease.

R. Lawson, M.D.